7. Evaluation of Alternative Packages

Four packages were defined for model testing. Each was formulated to address specific components of the future plan and allow a comparison of key facilities or capital programs against other facilities or programs. The packages do not reflect specific alternatives but are instead designed to indicate how well a key facility or group of facilities contributes or would contribute to improving system performance.

Each of the packages was modeled using the MAG regional transportation model. The modeling results provide some insight into how a plan or potential new facility is likely to operate and contribute towards a systemwide reduction of congestion and general improvement to travel in the area. The packages were modeled by combining projects from all three subarea studies (Northwest, Southwest, and Southeast Maricopa / Northern Pinal County) to permit more efficient application of the regional travel demand model.

These packages focus on highway options, as transit is being addressed in separate studies (MAG High Capacity Transit Study, and the Valley Metro/RPTA Regional Transit Systems Study). Findings from all of the background studies will be considered and analyzed further as appropriate in the RTP process. The outcome of this analysis will be a significant factor in the recommendation of a system for the Northwest Valley, the major elements of which will be considered in Phase II of the Regional Transportation Plan.

Beginning with a 2002 Base Year run, the packages have been defined as follows:

1. **Base Year** – reflects roadway conditions in 2000 and identifies a starting point for existing trouble spots and the potential for future system limitations as growth continues (Figure 22.)
2. **Future Base** (Long Range Transportation Plan (LRTP)-Based Reference) Scenario – includes the current LRTP system, with one principal exception, updated to include additional arterial improvements contemplated by individual communities in their General Plans. This plan also includes a logical buildout of the arterial network grid and likely arterial improvements though they may not yet be identified in the regional plan for implementation. LRTP-specified freeway enhancements are included in this package except for widening of I-17 between Dunlap Avenue and I-10. Other widenings to existing freeways are left for consideration in Package 3 to better assess their contribution to the overall plan (Figure 28.)

   Transit facility and service improvements as specified in the current LRTP are included in this modeling package (i.e., a tripling of local bus service, tripling of dial-a-ride service, quadrupling express bus service, and completing a 39-mile light rail system. It also included BRT as well as local circulators for the express bus network and light rail system. A regionwide system of more than 20 public park-and-ride lots was also part of the 2002 LRTP).
3. **Enhanced Corridors** – Building on the LRTP-Reference or “Future Base” Network, this package includes specific improvements to existing freeways and adding general purpose or HOV lanes to address congested segments (Figure 35.) Widenings to existing freeways were

generally constrained by right of way or infrastructure limits. Upgrading of rural facilities to partially controlled access facilities based on feedback from local communities was also incorporated, e.g. Northern Avenue "Superstreet", Sun Valley Parkway, and the CANAMEX Corridor north of I-10. Minor additional arterial improvements were also made.

4. **New Corridors** – Potential new freeways and partially controlled access facilities are tested in Package 4[6]. This includes:
   - Loop 303 as freeway from I-10 to I-17
   - New River Extension freeway from Loop 303 to New River Road
   - Wickenburg Bypass – new facility
   - Carefree Highway Expressway – 6 lane expressway.
   - Loop 101/Loop 303 Connector
   - I-17 improvements:
     - Option A, 20-lane facility between Loop 101 and I-10.
     - Option C, an additional lane in each direction between Peoria Avenue and Loop 101.
   - Various freeway interchanges.
5. **Total Package** – This package is intended to add all elements together and represents the only package that contemplates significant transit improvements based on the work from the High Capacity Transit Study and the Regional Transit Systems Study. It will not be modeled for the Subarea studies.

7.1 Base Year

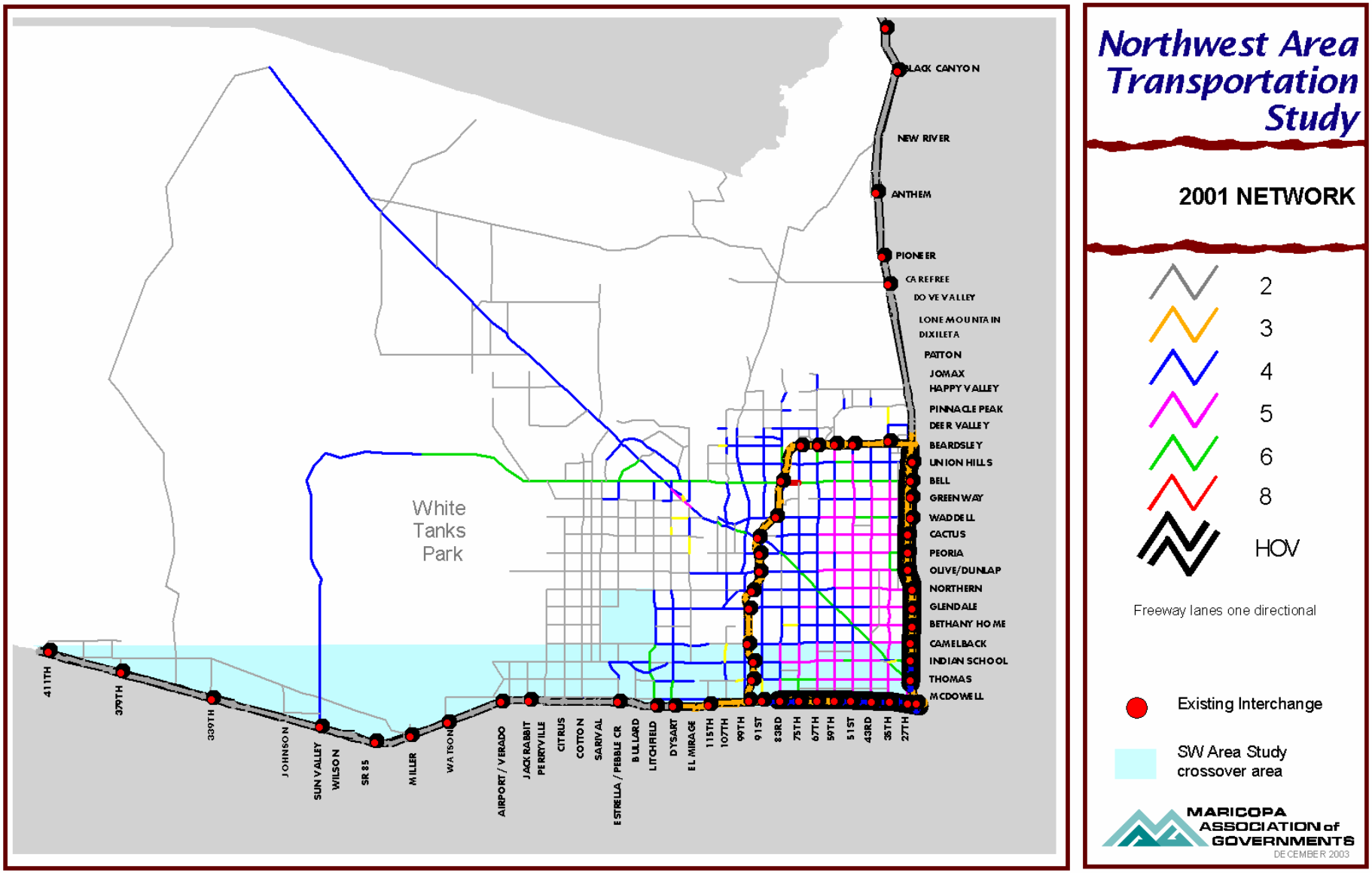
The Base Year model run shows current limitations in the system and provides a starting point in the analysis to address future challenges. Most of the issues identified in the Consultation Plan as part of discussions with local jurisdictions are based on the understanding of problems in the transportation system today, and the base run model results helps confirm and expand upon consultation feedback on the key issues that need to be addressed. Cities and other agencies want assurances that a future system will resolve those difficulties. At the same time, the Base Year begins to show how the existing system foretells the need to introduce new facilities and services to correct problems that have developed over time. While it may not show specific future needs, it can indicate the beginning of trends that are likely to grow in conjunction with anticipated changes in land use.

7.1.1 General Description of Roadways System

The Northwest Valley is served by a partial grid roadway system that connects major activity centers with a hierarchy of roadways ranging from local streets in neighborhoods to limited access freeways for interregional travel. The concept of the street network's grid roadway system is a series of north/south and east/west arterial roadways, which provide access to adjacent land uses, generally consistent application of traffic control regulations, and a significant level of regional movement.

[6] Three options or alternative scenarios, referred to as Options A, B, and C were modeled regionally. Only Options A and C were relevant to NWATS. Option A and C are similar except in the treatment of I-17 between I-10 and Loop 101. Option A adds substantial new capacity equivalent to approximately five or six additional lanes in each direction while Option C reflects the existing long range plan with minimal widening.

Figure 22: 2001 Network



Though not complete, much of the existing street system layout is either in place or planned according to a grid concept. The main exception to the grid layout is Grand Avenue, one of the area's original roadways, which runs northwest/southeast through the Valley. Grand Avenue is US 60 and the major surface roadway in the Northwest Valley. It provides a high level of access to area uses that have evolved along the roadway, but it also disrupts the grid traffic pattern.

Among the impacts of Grand Avenue are the creation of complex six-legged intersections and truncation of local streets that reroute local traffic onto the arterial system for even very short trips.

Additional characteristics that define the Northwest Valley Highway Network are shown in Table 18. These will be used as a basis for further analysis along with the anticipated land use changes to help establish network sizing goals for the area.

7.1.2 Traffic Signal/Intelligent Transportation Systems

The signal systems and coordination in the Northwest Valley are operated independently by each city. With the exception of Phoenix, there are no central signal control systems among the local agencies in the area, limiting opportunities for areawide implementation of signal coordination in the near future.

Consistent with the MAG ITS Strategic Plan, Phoenix, Glendale, Peoria, and Surprise are part of the regional program to encourage signal coordination across jurisdictional boundaries.

Table 18: 2002 Centerline Lane Miles and Lane Miles by Facility Type

	Jurisdiction		MPA	
PLACE	Centerline Mi	Lane Mi	Centerline Mi	Lane Mi
AVONDALE	14	58	22	86
BUCKEYE	31	108	102	331
EL MIRAGE	17	44	17	44
GLENDALE	115	484	183	648
GOODYEAR	41	108	55	148
LITCHFIELD PARK	5	17	7	26
PEORIA	105	349	115	379
PHOENIX	193	854	253	1,104
SURPRISE	69	188	173	450
TOLLESON	1	5	4	27
WICKENBURG	4	14	14	58
YOUNGTOWN	0	1	1	4
MARIC CO	357	987	89	308
TOTAL	**952**	**3,218**	**1,034**	**3,614**

	STUDY AREA	
Facility Type	Centerline Mi	Lane Mi
Freeways	131	648
Expressways/Parkways	70	197
Collectors	138	294
Arterials	695	2,475
TOTAL	**1,034**	**3,614**

Figure 23: 2001 Network: Average Daily Volumes

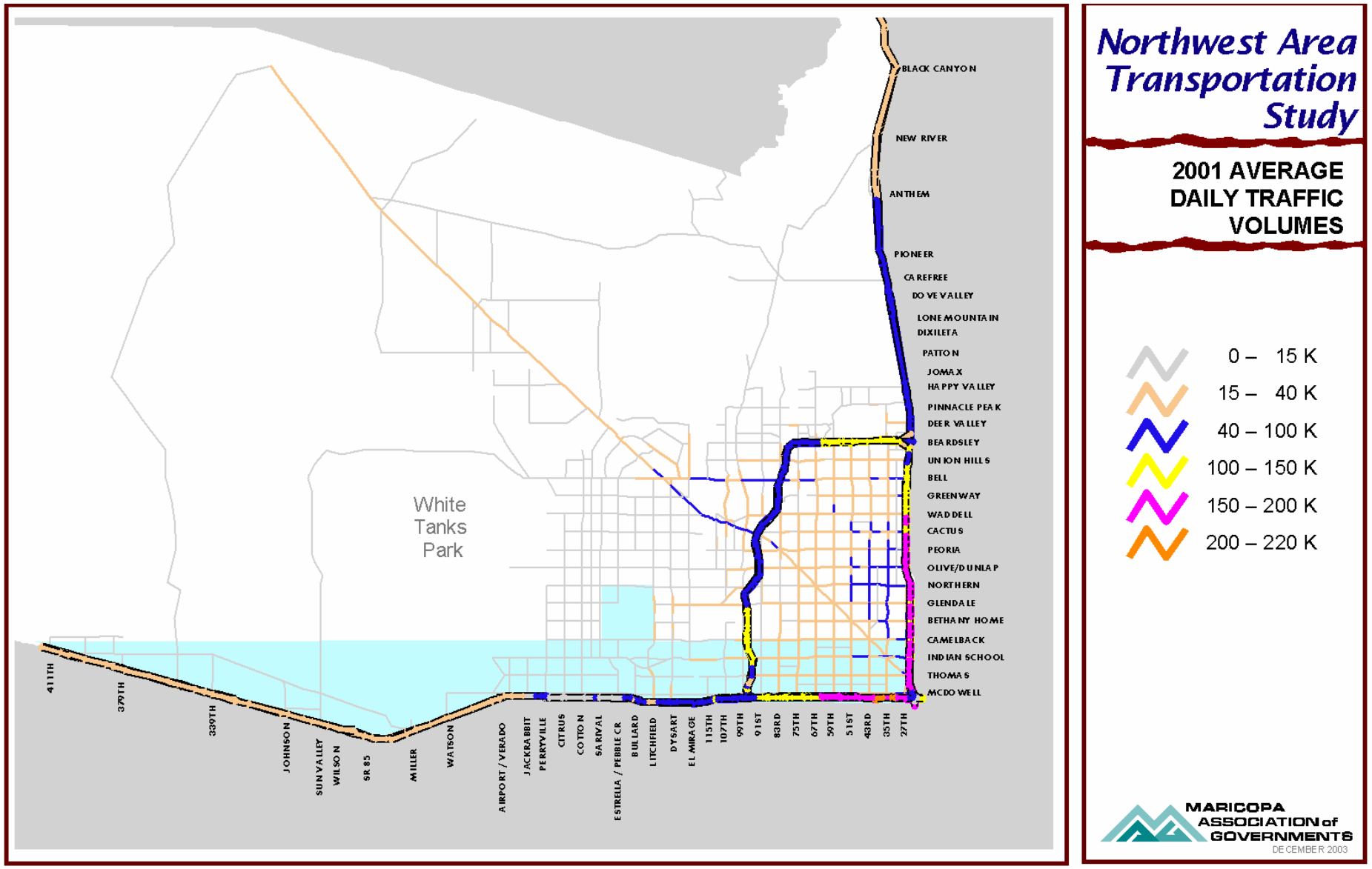


Figure 24: 2001 Network: Freeway Level of Service

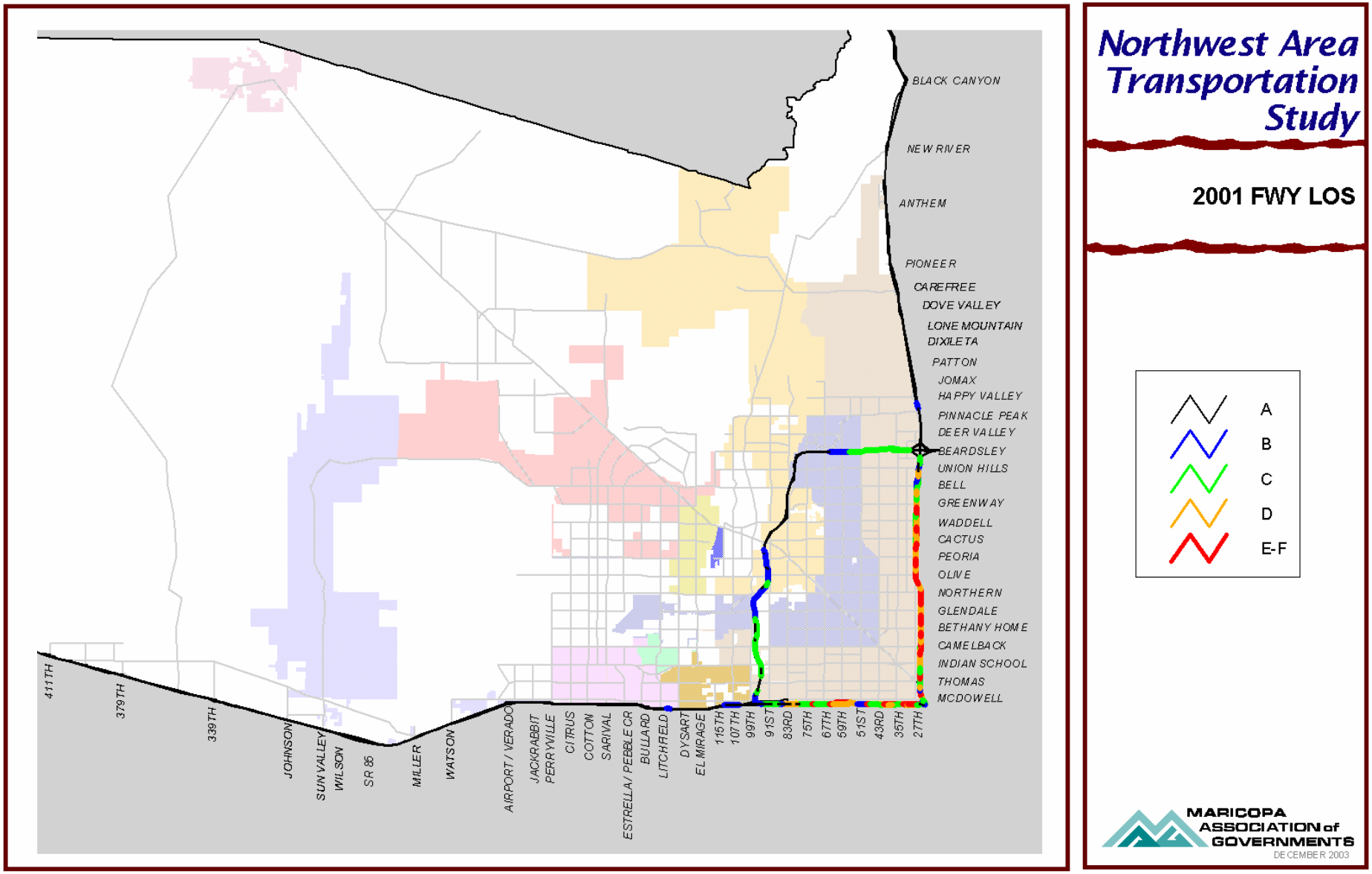


Figure 25: 2001 Network: HOV Level of Service

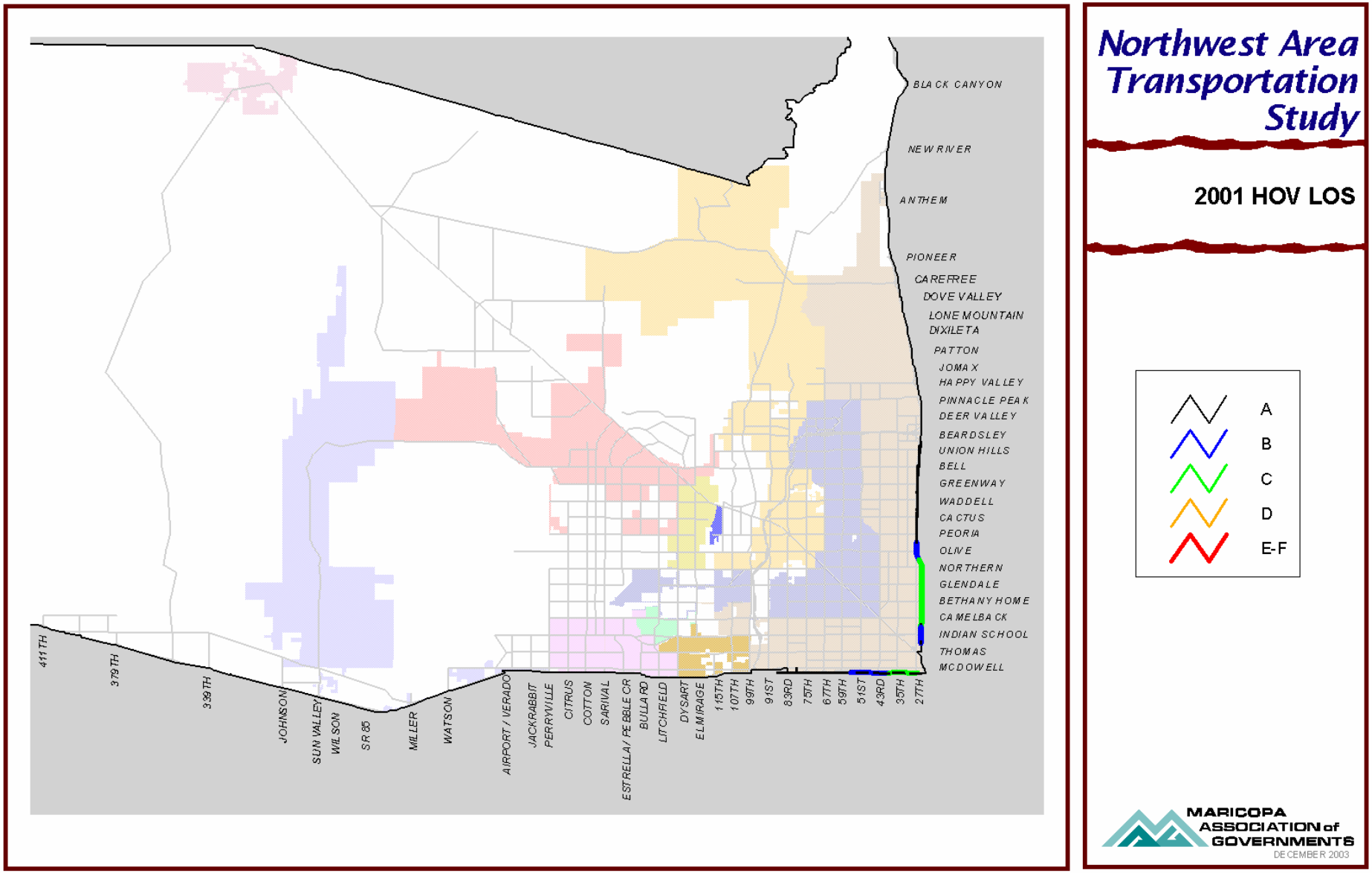


Figure 26: 2001 Network: Arterial Segment Level of Service

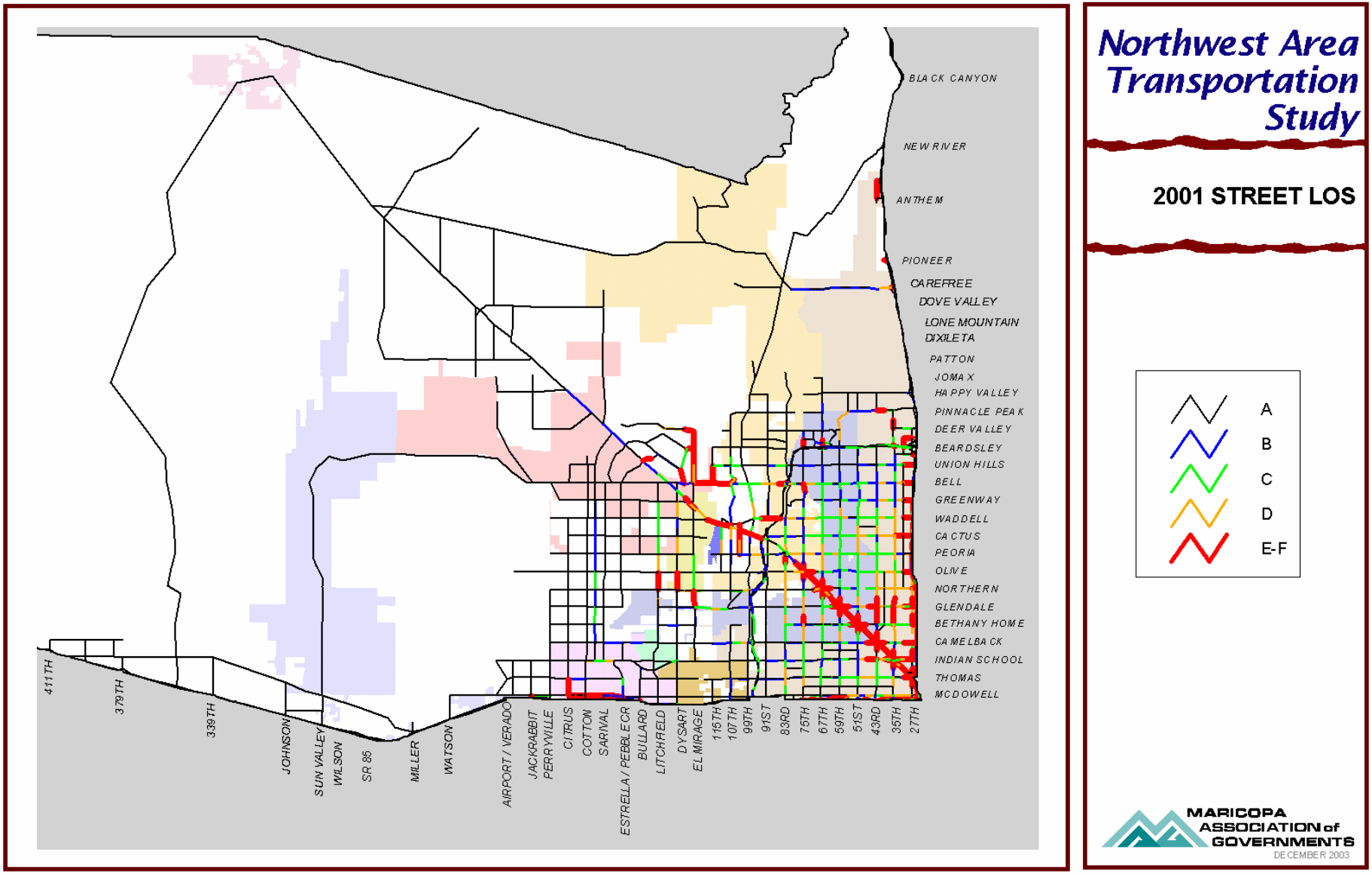
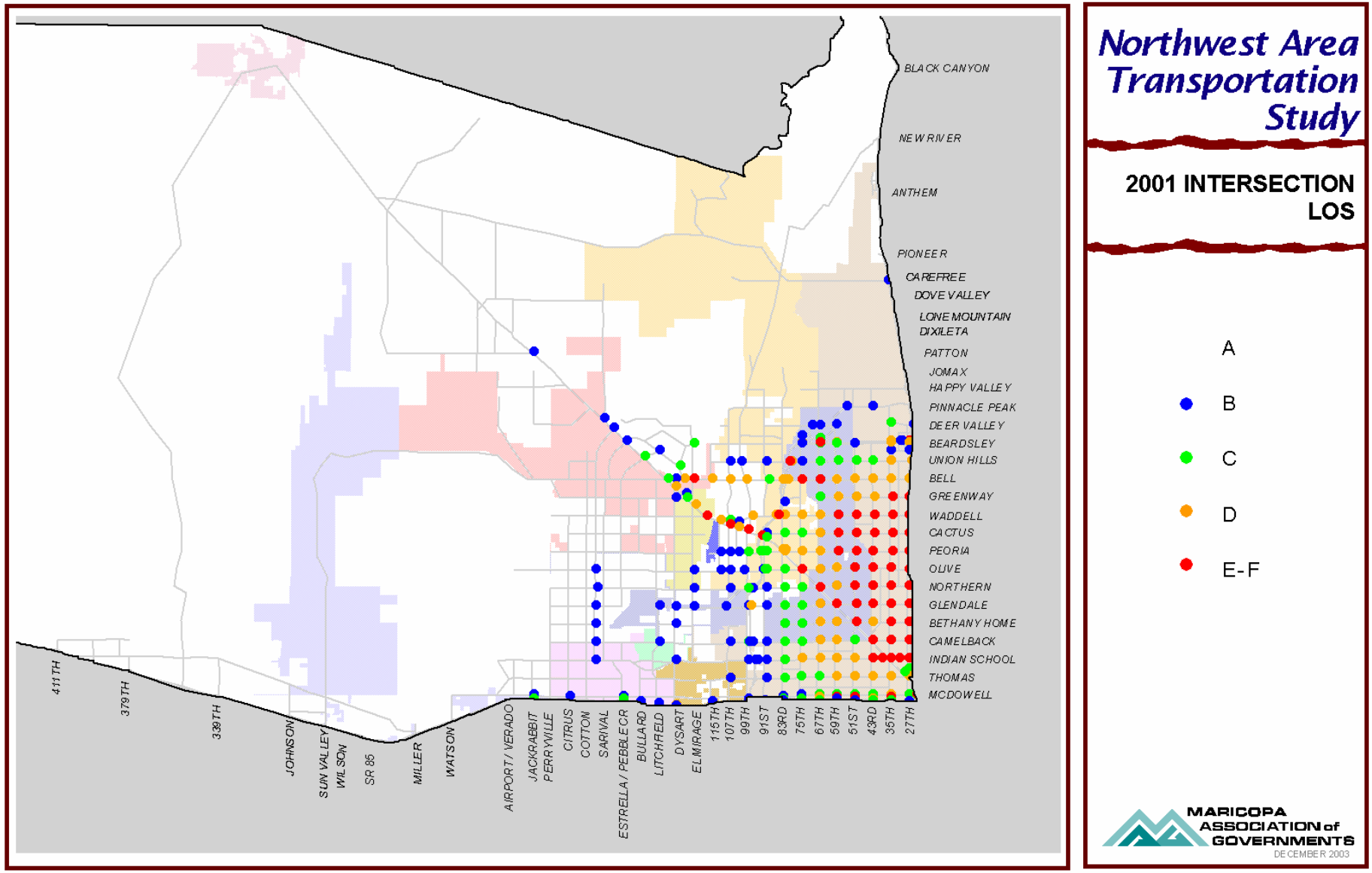


Figure 27: 2001 Network: Intersection Level of Service



7.2 Future Base Network (LRTP-Based Reference Scenario)

The current Long Range Transportation Plan represents a vision for 2022 and includes a number of enhancements to the existing system. The future base network contains an extensive expansion of roadways to the west and north of the currently urbanized area. Most of the new arterial facilities are tied to future developments that are expected to fund needed transportation projects in conjunction with land use improvements. Among these new roadways are some that could be designated as high capacity arterials to either help complete the grid or provide added capacity within the existing grid.

Each community or agency has offered changes based on the latest information in the transportation or circulation elements of their General Plans and the closure of critical gaps in the arterial grid. Some of these adjustments are incorporated at the request of the local agency to test their value in the system plan. Should they prove important in terms of travel demand, they typically will require further study to determine feasibility and acceptability to local communities and stakeholders before they could be designed and constructed.

The Future Base network is a foundation upon which to build the future Northwest Valley network for the RTP. Among the major components of this option is Loop 303, which is shown as an expressway, Grand Avenue improvements, additional arterial river crossings and gap closures in the arterial grid where appropriate. These projects have been included in the Future Base Network model runs to reflect a future plan that is more compatible with the many growth-related changes since the LRTP was adopted. As in the lists of projects identified by the cities, there may need to be additional evaluation of some of these new roadways before they can be considered in the Regional Transportation Plan.

This network attempts to strengthen the integrity of the arterial grid by proposing an extension of grid roadways in areas identified for future growth. The Buckeye MPA is a good example where high anticipated growth in some land use scenarios could necessitate a robust network to manage traffic effectively. The Future Base Network shows a dense network of new roadways associated with possible development in that area. Similarly, though substantially less dense, grid linkages are proposed for the unincorporated areas in northern Surprise and Peoria. However, most of the roadways in those cities have been taken from their General Plans.

Other key additions to the Future Base network are new river crossings and reflection of changes already identified in studies such as the Grand Avenue NW Corridor and various improvements in Glendale as a result of their successful sales tax election in 2001. Note the development of the arterial grid is led by local jurisdictions and is subject to change, particularly in rapidly-growing suburban areas.

7.2.1 Key Elements of the Future Base Network Arterials

- Sun Valley Parkway/Bell Road – widened to 6 lanes and modeled as an expressway. It is the major arterial for development west of the White Tank Mountains in Buckeye.
- Grand Avenue - widened to 6 lanes as far as Loop 303 in accordance with the recent MAG Grand Avenue NW Corridor study and previous studies.

- Happy Valley/Jomax - shown as a 6 lane roadway east of I-17 (connecting at a common Loop 303 interchange). This roadway is a significant reliever for Bell Road across the northern tier of the Northwest Valley.
- Carefree Highway – widened to 6 lanes from I-17 to Sarival Road (163rd Ave), 4 lanes from Sarival to US 60. The easterly portion provides capacity for major growth in the North Phoenix area. The westerly portion is part of the rural highway or expressway concept to enhance capacity and protect right-of-way.
- Perryville Road – widened to 6 lanes from I-10 to Bell Road. There are few north-south routes between Loop 303 and the White Tank Mountains. This will need to be further evaluated for feasibility but offers an option for improved local access in the area that will help with distribution of sub-regional traffic as the area grows.
- Dysart/El Mirage – identified as a 6 lane road with a possible connection near the City of El Mirage. The alignment is designed to be able to take advantage of a combination of the two roadways as a key north-south arterial that runs from Carefree Highway to I-10. The specific analysis that will need to be done is to assess if the two roadways will function better than an enhanced single six-lane arterial that extends the length of the study area.
- Beardsley Road – 6 lane arterial connection to Loop 101 and basis for an enhanced arterial connector/expressway between Loops 101 and 303, using both Lake Pleasant Road and Happy Valley Road. The proximity of the two freeway type facilities in this part of the Northwest Valley is likely to promote travel between them. An improved connector that can carry high volumes is proposed as a means to provide sufficient capacity and minimize impacts to adjacent development.
- Lake Pleasant Road – widened to 6 lanes from Deer Valley Road to Carefree Highway. It will serve major growth along this corridor.
- Peoria Avenue – new crossing of the New River is desired by Youngtown and El Mirage and will afford an additional all weather crossing of the New River.
- Cactus Road - new crossing of the New River. Similar to Peoria Avenue, but subject to more challenges. Youngtown may have concerns about impact to Town facilities and increase of traffic in the community.
- Thomas Road – new crossing of the Agua Fria River. Completes the grid in this area, but is a major bridge and an expensive project that will need to be further analyzed.
- Many new arterials in the west and north areas of the study area to accommodate new development. These are expected to be covered by stipulations and development fees as development proceeds.
- ITS Enhancements - Arterials include a cost factor ($100k/mile) to cover ITS improvements in the expansion of the system. Emphasis would be placed on funding the arterials identified in the MAG ITS Strategic Plan, but cost factor would be added to all arterials for estimating purposes.

Figure 28: Future Base Network

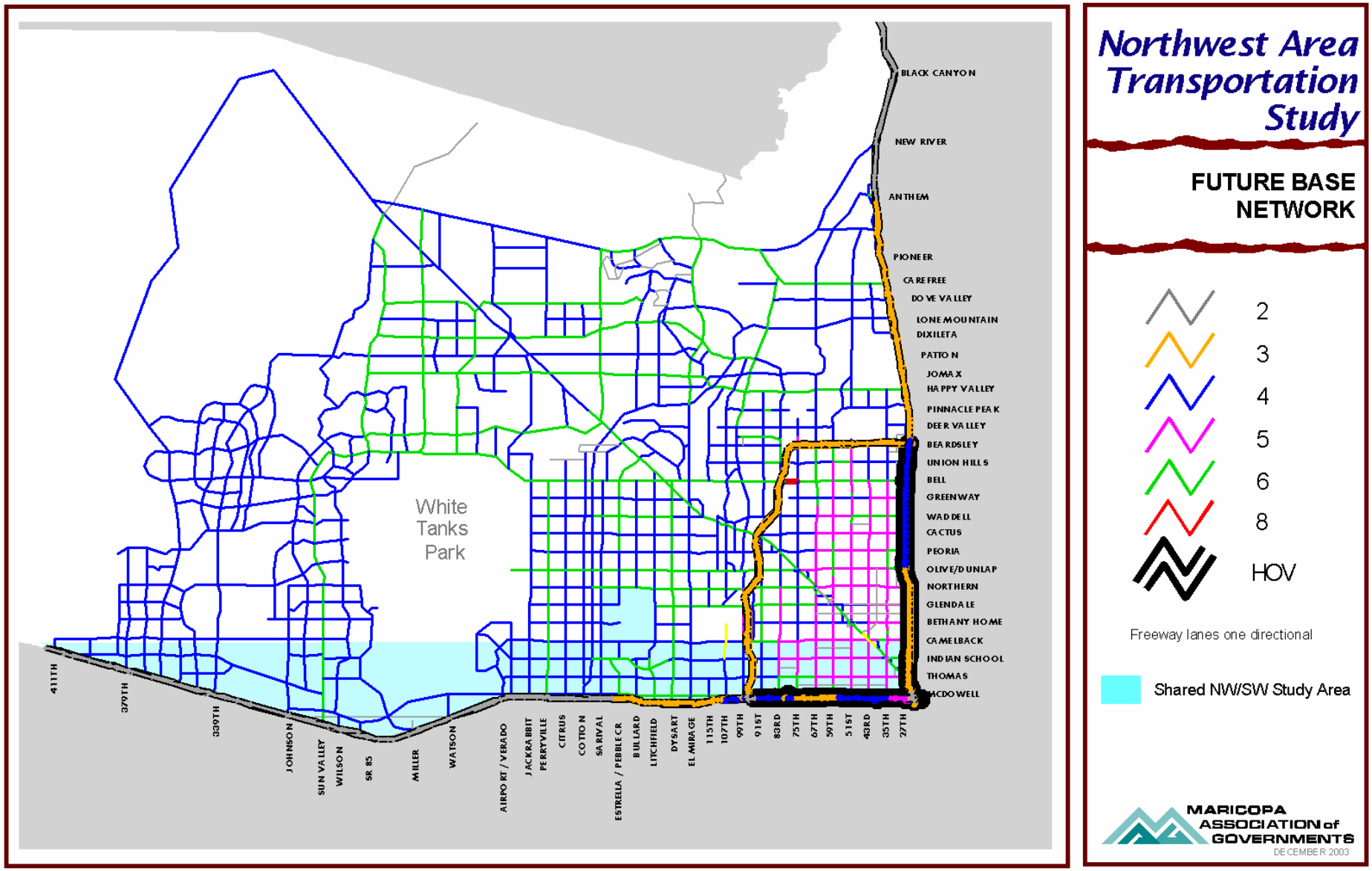


Table 19: Future Base Centerline Lane Miles and Lane Miles by Facility Type

	Jurisdiction		MPA	
PLACE	Centerline Mi	Lane Mi	Centerline Mi	Lane Mi
AVONDALE	40	186	44	203
BUCKEYE	191	809	524	2,187
EL MIRAGE	35	175	31	153
GLENDALE	206	953	306	1,424
GOODYEAR	47	223	78	357
LITCHFIELD PARK	13	56	22	103
PEORIA	221	984	311	1,404
PHOENIX	380	1,654	432	1,843
SURPRISE	160	755	409	1,922
TOLLESON	9	43	4	17
WICKENBURG	18	73	35	139
YOUNGTOWN	6	26	8	35
MARIC CO	1,039	4,539	161	689
TOTAL	**2,364**	**10,476**	**2,364**	**10,476**
			STUDY AREA	
Facility Type			Centerline Mi	Lane Mi
Freeway			113	603
HOV			25	50
Arterial			2,226	9,823
TOTAL			**2,364**	**10,476**

Future Base Network Costs

The total cost of expanding the arterial network to improve the integrity of the grid and provide for future development adds to over $4 billion. Much of this cost is expected to be borne by development, particularly in the outer reaches of Buckeye, Surprise and Peoria.

Table 20: Future Base Network Improvement Costs

Element	Centerline Miles Added	Cost (Millions)
Freeway Widening	25	$200
Arterial Widening	88	$396
New Arterials		
4 Lanes	890	$2,670
6 Lanes	234	$936
River Crossings		$50
TOTAL		$4,252

Figure 29: Future Base Network: 2020 Volumes

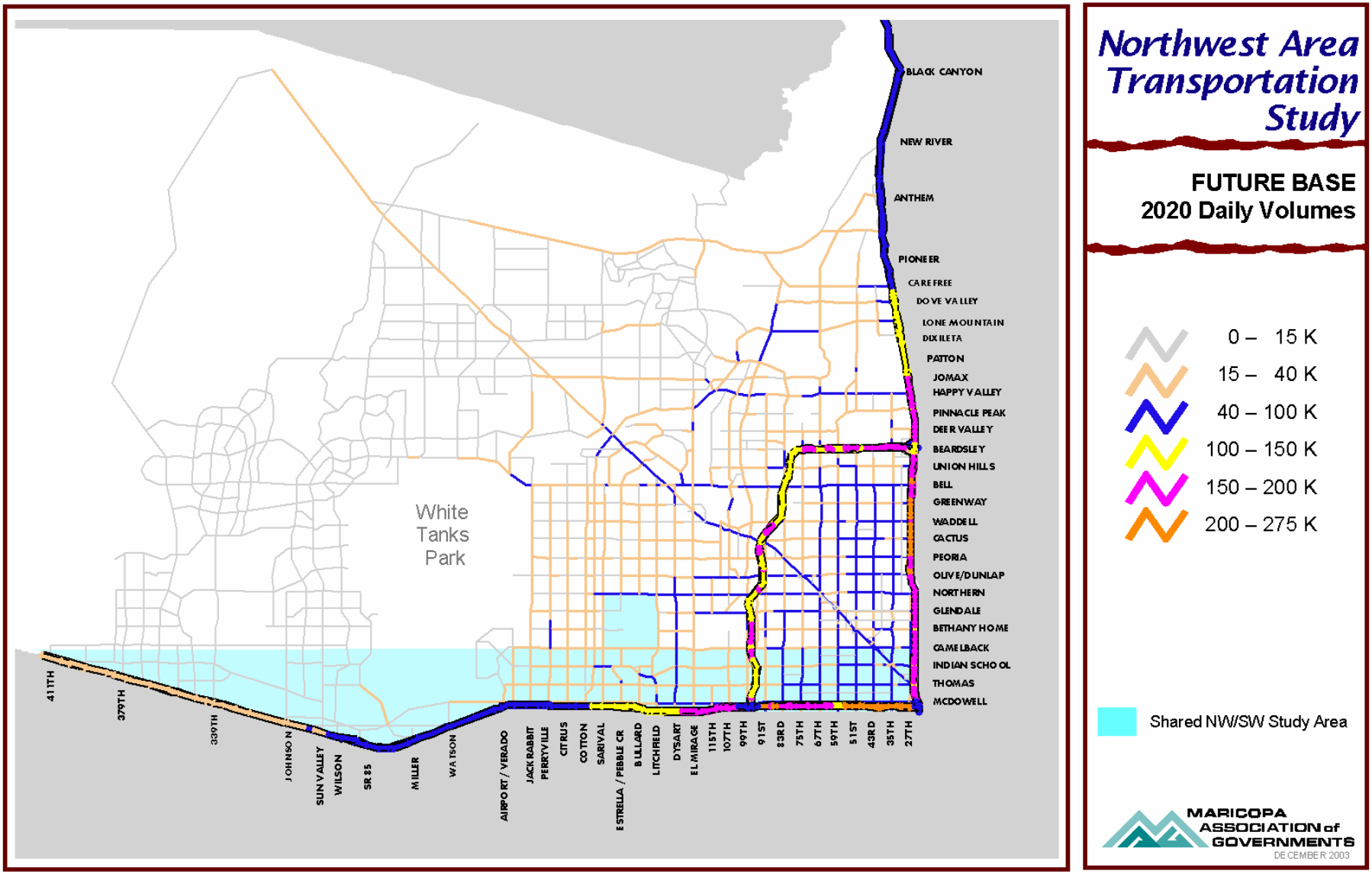
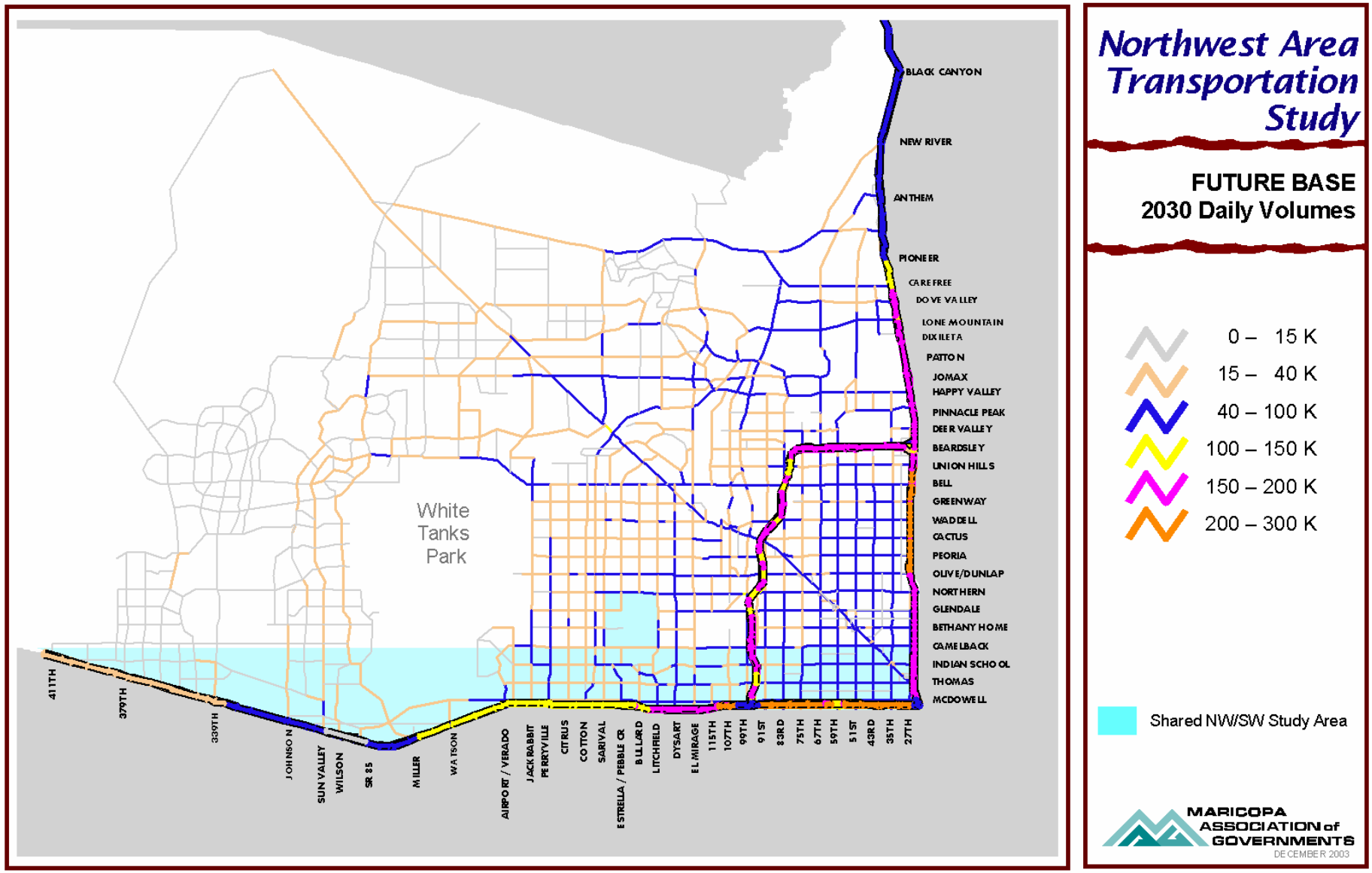


Figure 30: Future Base Network: 2030 Daily Volumes



7.2.2 Future Base Network Level of Service

As evidenced in the level of service maps that follow, the arterial network becomes a very congested system in later years even with the construction of major new facilities. The bottom line is the arterial network must be strengthened where it can to support the new freeways and expressways. The area contained within the Loop 101, I-17 and I-10 is the most challenging in terms of future conditions. Programs such as Glendale's GO Glendale will become critical to maintaining a reasonable level of service on the primary system of vehicular travel in the transportation network. Future funding sources will need to be available to make similar improvements to the arterial network as growth in the area continues.

Figure 31: Future Base Network: 2030 Freeway Level of Service

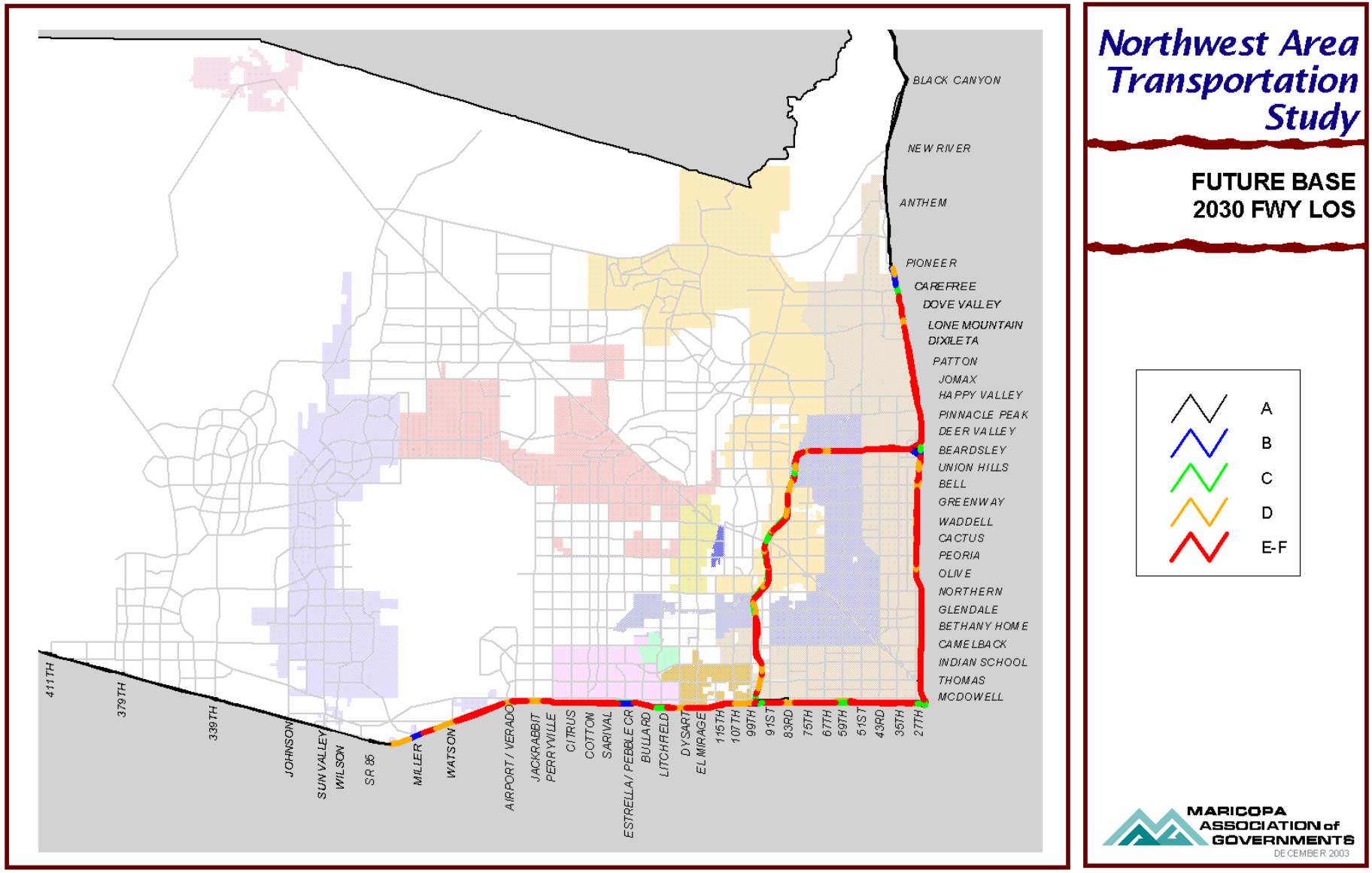


Figure 32: Future Base Network: 2030 HOV Level of Service

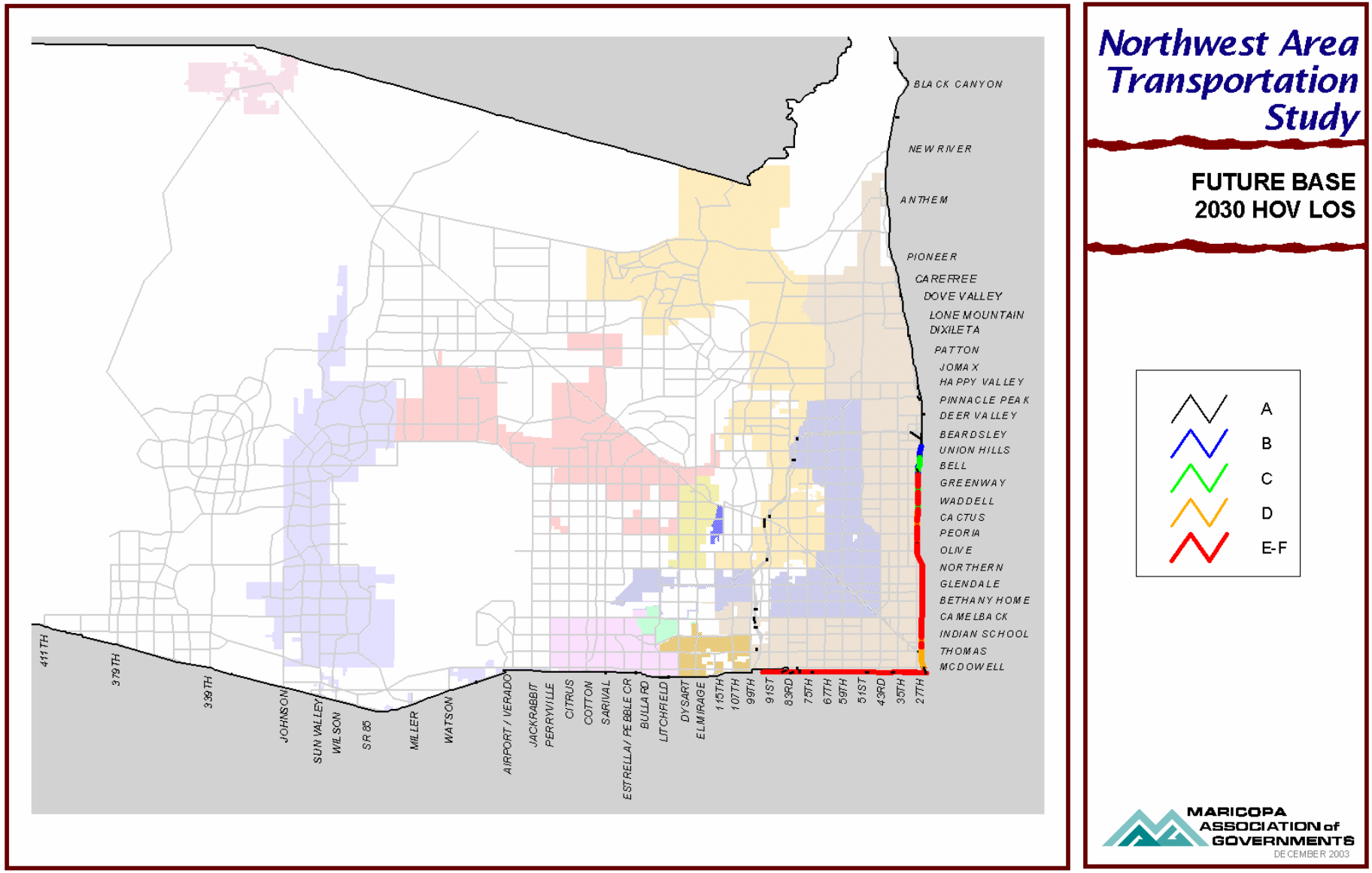


Figure 33: Future Base Network: 2030 Arterial Level of Service

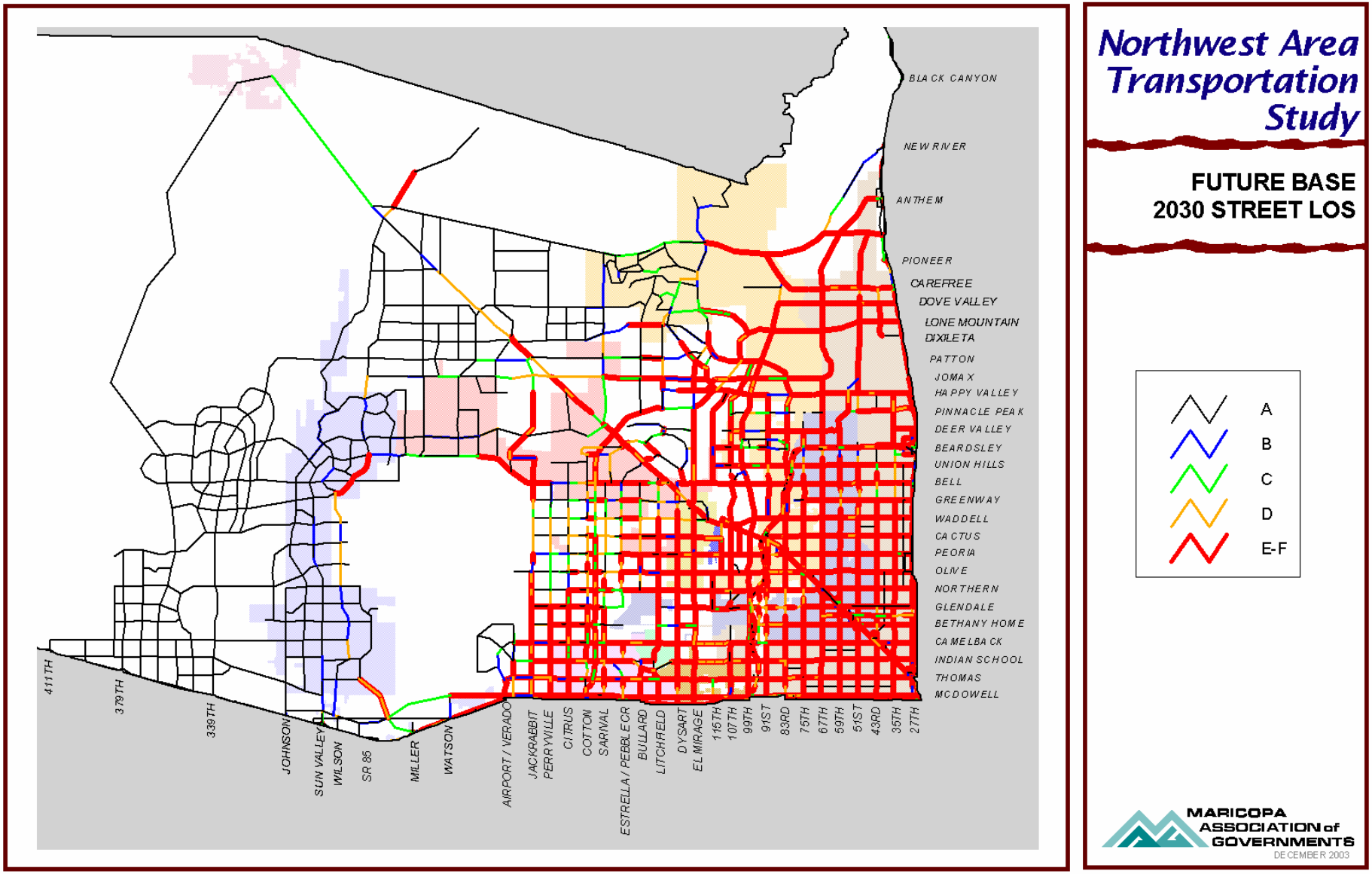
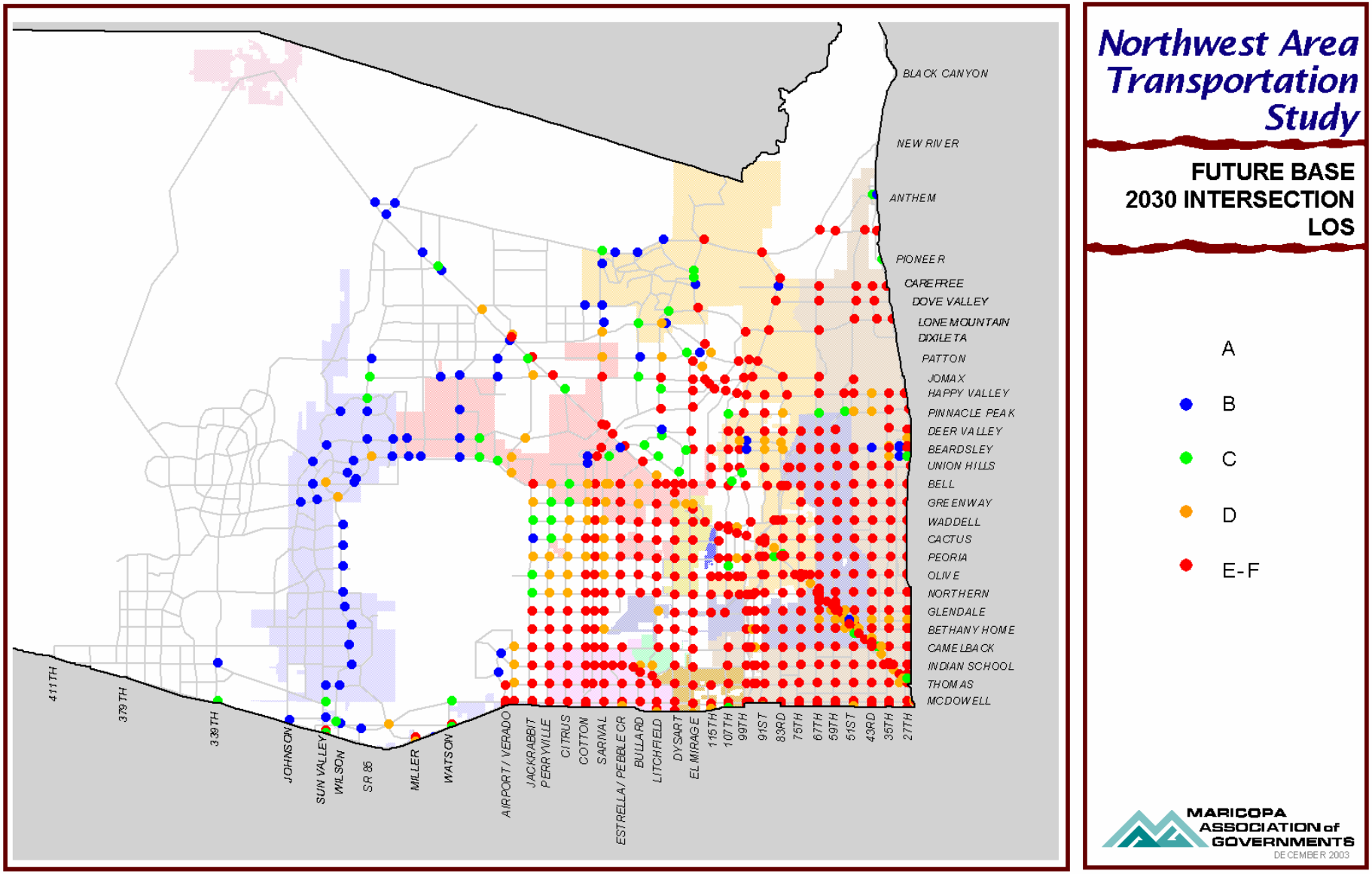


Figure 34: Future Base Network: 2030 Intersection Level of Service



7.3 Enhanced Corridors Scenario

The premise of this option is to evaluate the effectiveness of improving the functionality of existing freeways by adding lanes or interchanges at critical locations and improving arterials where they can be modified to provide a higher level of service. A key element of the Enhanced Corridors package is the build-out of regional freeways to maximum capacity within right-of-way and structural limitations, based on an assessment of build-out capacity developed for the MAG Bottleneck Study that is underway concurrently.

Among the types of projects included in the Enhanced Highways Package are the Northern Avenue Superstreet (shown as a partially access-controlled limited expressway in Figure 35) identified in Glendale's Transportation Plan and the improvement of Grand Avenue to an enhanced arterial between Loops 101 and 303 and as a limited expressway between Loop 101 and I-17. The Enhanced Roadway options will also show the addition of new general purpose and HOV lanes to I-10, I-17, and Loop 101. All existing freeways are shown with additional lanes. I-17 has been tested in a variety of configurations, but is shown in the map below with only 3 general purpose lanes and an HOV lane from I-10 to Dunlap Road. It widens to 4 lanes and an HOV lane from Dunlap to Loop 101 and to 5+1 north of Loop 101 to Anthem.

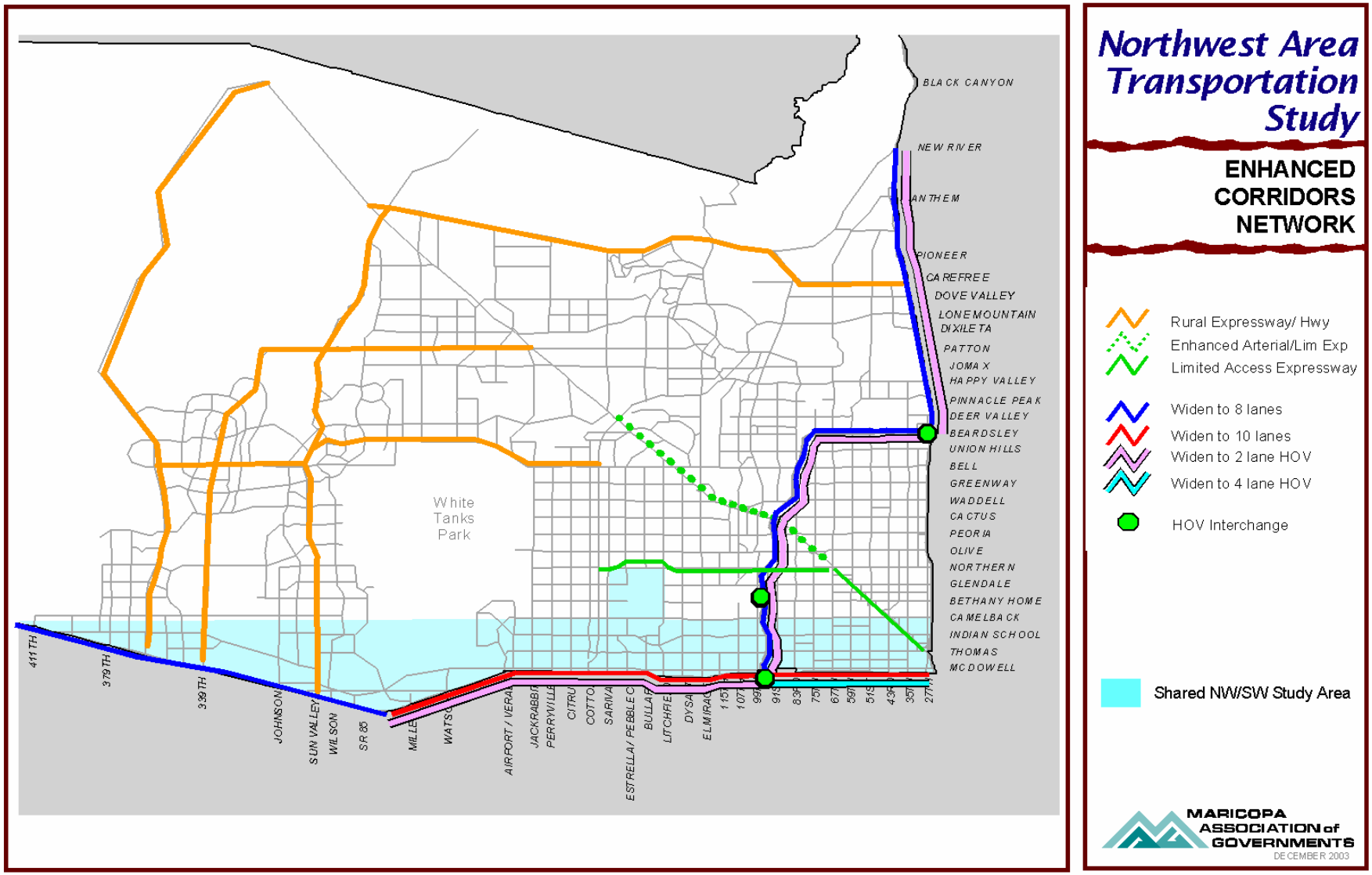
I-10 also receives additional lanes (both general purpose and HOV) to handle rapidly increasing demands from the West Valley. The segment from I-17 to Loop 101 is widened to 5 general purpose lanes and the associated HOV facility to two lanes each way. From Loop 101 west, the I-10 freeway is widened to four general purpose lanes and a single HOV lane each way. The HOV lane extends to SR 85. The four general purpose lanes reach to 411th Avenue.

HOV lanes can be used for carpools, BRT or other transit services. Special HOV interchanges at key system locations are also introduced at appropriate locations to further enhance the regional utility of the HOV system. The proposed Maryland Avenue partial interchange at Loop 101 in the vicinity of the new sports stadiums in Glendale is a good example of another special purpose HOV facility.

7.3.1 Arterial Roadway Corridor (ARC)

While the emphasis is on improved freeway or "freeway-like" elements, it is also appropriate to test the functionality of key arterials or "enhanced arterials" where they can contribute to regional mobility. The ARC designation (also "rural expressway") in this modeling package was also given to some remote facilities where it is intended to offer opportunities to widen these roadways if needed, but also to protect rights-of-way and scenic value where they apply. Key roadways such as US 60, SR 74, CANAMEX, Sun Valley Parkway and others in the outlying areas may not require more than four lanes for a long time, but the option to expand them to even six lanes must be protected from encroachment and excessive access if they are to maintain their status in the network over time and continue to move people efficiently.

Figure 35: Enhanced Corridors Network



7.3.2 Key Additions in Enhanced Corridors Scenario:

- **I-17 (I-10 to Loop 101)**
  - Dunlap to 101: widen to 4 + 1 lanes each way
  - Dunlap to I-10: 3 + 1 lanes each way (existing)

  This stretch of I-17 is subject to very heavy traffic volumes already, which will only increase in the future. The freeway would require substantially more lanes than are possible given existing right-of-way and structural limitations. Though only a single additional lane for one section is proposed here given space limitations, the need for capacity along this corridor goes well beyond an additional lane of demand. Furthermore, there will be a growing bottleneck as the number of lanes south of this improvement remains constrained to three general purpose and one HOV.

  The New Corridors scenario, reviewed later, tests additional options for providing substantial additional capacity along I-17 between Loop 101 and I-10.

  Model projections indicate that this segment is expected to carry well over 200,000 vehicles in the Enhanced Corridors condition. That represents a LOS of "F" on a highway designed for 165,000. Potential alternatives are expensive, e.g., double-decking the freeway and dedicating lanes for special purpose other than HOV (e.g., truck lanes, through lanes, etc.).

- **I-17 (north of Loop 101)**
  - Widen to five lanes each way and addition of an HOV lane from Loop 101 to Carefree Highway.
  - Widen to four general purpose lanes and one HOV from Carefree Highway north to New River.

  In this portion of I-17, additional lanes to accommodate future growth can still be provided. The need for five lanes reflects not only the need for freeway capacity as development moves north, but the limitations of the adjacent arterial system as a result of topographic and land use obstructions. An HOV lane would also serve to encourage ridesharing and transit usage in the area as those services expand to the northern reaches of the valley.

- **I-10 (I-17 to Loop 101)**
  - Widen to 5 lanes each way and 2 HOV lanes each way.

  In the year 2030, as indicated in model runs, traffic volumes in this scenario are expected to grow to 320,000, with LOS F as far west as Loop 101. The current capacity of approximately 200,000 will be overwhelmed well before that time. There is available space for one general purpose lane and one HOV lane in each direction.

- **I-10 (Loop 101 to SR 85)**
  - Widen to 4 lanes each way and extension of HOV lane.

  The addition of 2 more lanes in each direction (including an HOV lane) west of Loop 101 can be accommodated without major impact to adjacent property, but in addition to property costs and mainline construction, it would require significant modifications to freeway interchanges and structures. Projected traffic volumes are expected to be as high as 180,000.

- **System HOV interchanges at I-17/Loop 101, I-10/Loop 101**

  To strengthen the appeal of the HOV system, freeway to freeway interchanges are proposed for the Loop 101 at both I-10 and I-17. The free flow from one HOV lane to another will help encourage use and minimize the merging now required when the HOV lanes terminate.

- **HOV interchange at Maryland/Loop 101**

  This new facility will offer direct access from the Loop 101 to the new football stadium and hockey arena in Glendale as part of the freeway HOV plan.

- **Northern Avenue Superstreet – Grand Avenue to Loop 303**

  There is limited east-west capacity in the Northwest Valley. There are few major roadways in place between Bell Road and I-10 that can accommodate major traffic flows. The City of Glendale has identified Northern Avenue as a "super-street" for the purpose of improving the east-west connectivity in the area. The exact definition of the Superstreet is not yet complete, but it is expected to consist of at least six lanes, additional access control and at least some grade separated interchanges to aid traffic flow.

  Because the concept for the roadway design is not yet defined, its implications for pedestrians and bicycles are also not yet understood, nor are its safety implications. For purposes of this document, a superstreet will be assumed to consist of *"six to eight lanes (three to four in each direction), limited access to adjacent land uses, no on-street facilities for bicycles and pedestrians, express bus/BRT only transit provisions and a strong emphasis on roadway throughput capacity enhanced by extensive use of intelligent transportations systems*."

  The application of such a facility in mature areas must address the issues of how travel patterns may change and what effect those changes can be expected to have on safety and local circulation and access. If changes are significant, they will also need to be provided for in the design of the roadway.

- **Grand Avenue – Limited expressway from Loop 101 to I-17**

  The limited expressway portion of Grand Avenue complements Northern Avenue as a key regional link designed to assist traffic through one of the most congested areas in the Valley. Some sections of Grand Avenue south of Loop 101 will be improved via the addition of grade separations and will operate more as an expressway than as an arterial. The remaining sections will continue to operate primarily as arterials.

- **Grand Avenue – Enhanced arterial from Loop 101 to Loop 303**

  This was the subject of a recently completed MAG Grand Avenue Corridor Northwest Study which proposes bolstering the capacity of Grand Avenue to accommodate higher volumes as growth moves toward the Northwest. It includes grade separations at key locations (i.e., El Mirage Road, Meeker/Reems Roads and 103rd Avenue), extension of ITS along Grand Avenue to as far north as Loop 303, and widening to provide better and more predictable lane configurations throughout. Access control is to be improved to the extent acceptable to local jurisdictions.

- **Expressway/Arterial Roadway Corridor (ARC)**

  This category does not have a specific definition as yet and cost reflects only the additional right-of-way required assuming a freeway/expressway right of way. It is shown as a means to encourage discussion about how to protect outlying roadways from encroaching development while the opportunity is still available. The protected space could be set aside for additional capacity, should it be needed, or as a scenic or urban buffer to protect viewsheds and establish credible setbacks from the road. It would be at least partially access controlled. For modeling purposes, these facilities were assumed to be expressway.

7.3.3 Enhanced Corridors Improvement Costs

The Enhanced Roadway plan is the most costly of all scenarios tested at about $2.5 billion. It includes some of the most extensive freeway and HOV lane widenings as well as major arterial special projects such as Grand and Northern Avenues. Enhanced projects are, for the most part, “retrofit projects” and impact existing land uses, rights-of-way and multiple cross streets which are typically very expensive to negotiate. On the other hand, these projects are among the most important in terms of their congestion mitigation benefits to the roadway system and must be considered high priorities.

The challenge will be to balance the funding of the enhancements against the need for providing a solid base network and the desire for many of the projects in the New Corridors plan.

7.3.4 Enhanced Corridors Level of Service

Though the addition of the new capacity of the Enhanced Corridors helps to mitigate some of the congestion in the Base Network, much of the system still operates at an unacceptable level of service overall. The amount of new capacity provided in this option makes a noticeable improvement, but requires yet further improvements to eliminate problems on key Corridors. Even newer areas such as Northeast Phoenix and areas west of Loop 101 still show significant congestion in 2030.

Table 21: Enhanced Corridors Centerline Miles and Miles by Facility Type

	Jurisdiction		MPA	
PLACE	Centerline Mi	Lane Mi	Centerline Mi	Lane Mi
AVONDALE	30	141	34	154
BUCKEYE	146	615	400	1,662
EL MIRAGE	26	133	24	116
GLENDALE	157	724	234	1,082
GOODYEAR	36	169	59	271
LITCHFIELD PARK	10	43	16	78
PEORIA	169	748	237	1,067
PHOENIX	290	1,257	330	1,401
SURPRISE	122	574	312	1,461
TOLLESON	7	33	3	13
WICKENBURG	14	56	26	106
YOUNGTOWN	5	20	6	27
MARIC CO	793	3,449	123	524
TOTAL	**1,805**	**7,961**	**1,805**	**7,961**
			STUDY AREA	
Facility Type			Centerline Mi	Lane Mi
Freeway			135	710
HOV			27	54
Arterial			1,643	7,197
TOTAL			**1,805**	**7,961**

Table 22: Estimated Cost of Enhanced Corridors Improvements

Element		Lane-Miles Added	Avg. / High 2030 Volume (Thousands)	Number of Lanes Needed	Cost (Millions)
I-10	General Purpose	137	212 - 320	4 to 5	$880
	HOV	60	10 - 32	1 to 2	$320
I-17	General Purpose	68	170 - 290	3 to 5	$272
	HOV	34	8 - 23	1	$102
Loop 101	General Purpose	44	196 - 240	4	$176
	HOV	44	4 - 12	1	$215
Grand Avenue		22	48 - 82	6	$314
Northern Avenue		13	79 - 132	6 to 8	$216
Rural Highways		152 (ROW only)	-	2 to 4	$608
Total					**$3,103**

Figure 36: Enhanced Corridors: 2020 Traffic Volumes

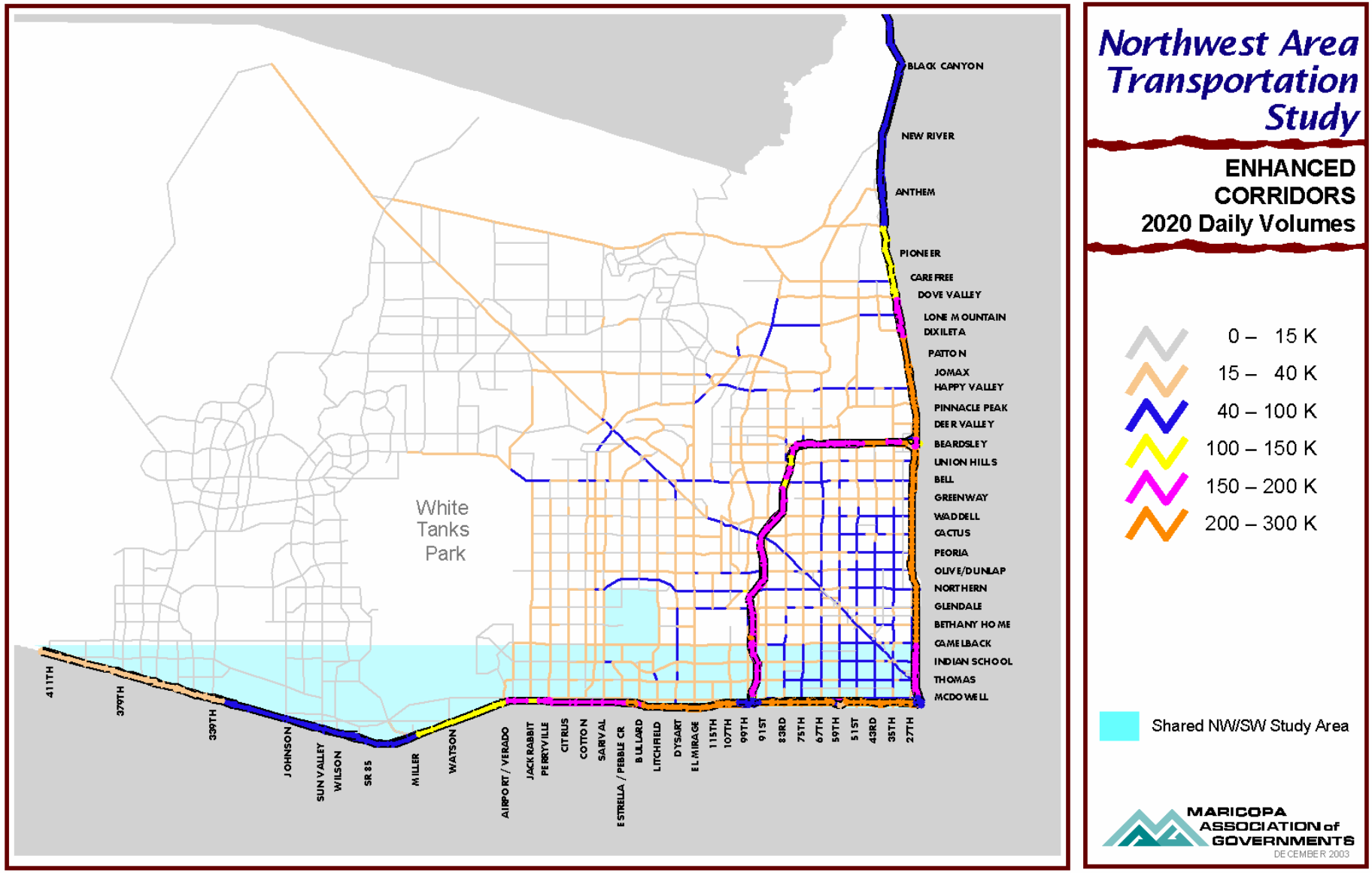


Figure 37: Enhanced Corridors Network: 2030 Daily Volumes

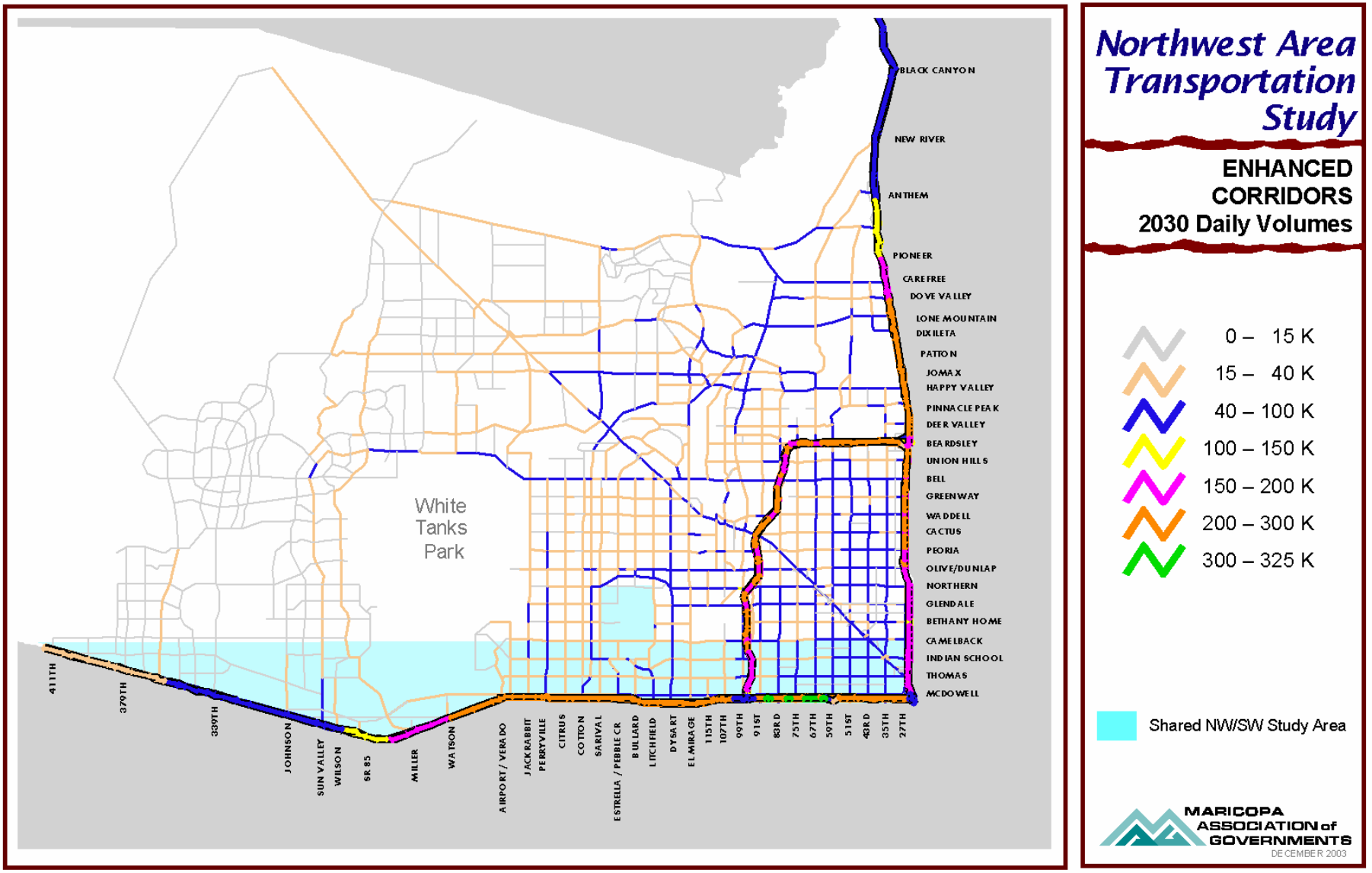


Figure 38: Enhanced Corridors Network: 2030 Freeway Level of Service

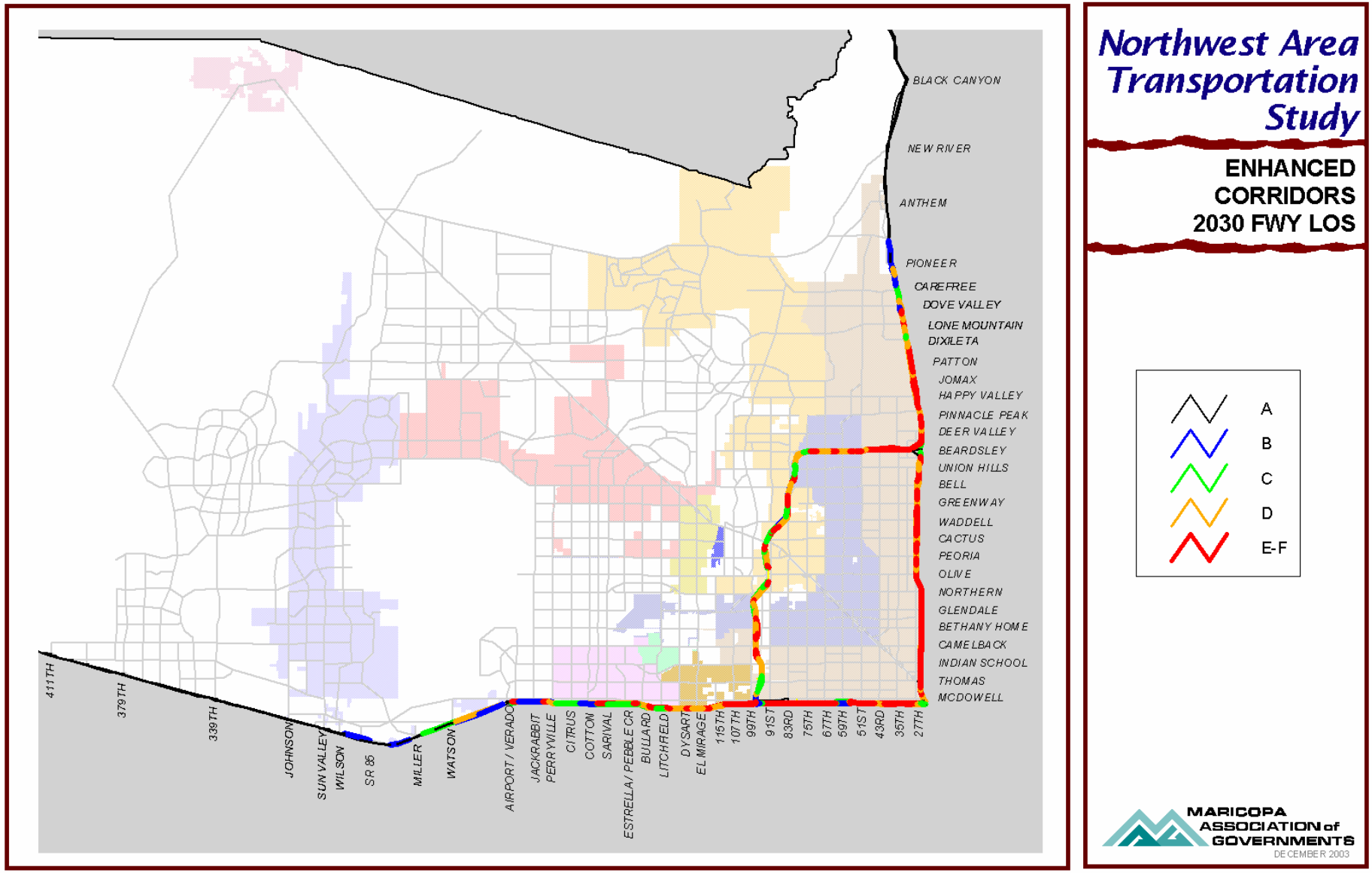


Figure 39: Enhanced Corridors Network: 2030 HOV Level of Service

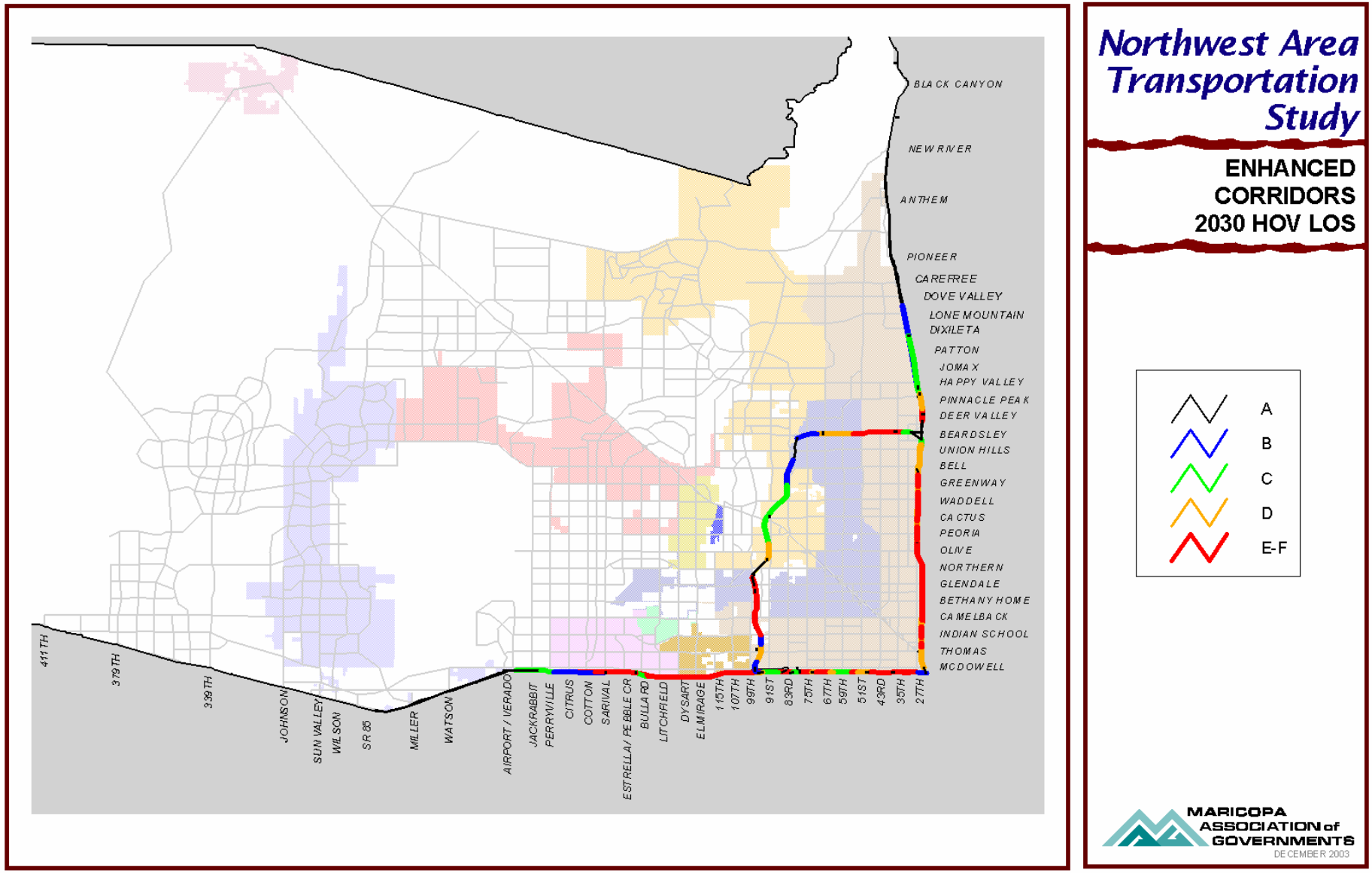


Figure 40: Enhanced Corridors Network: 2030 Arterial Segment Level of Service

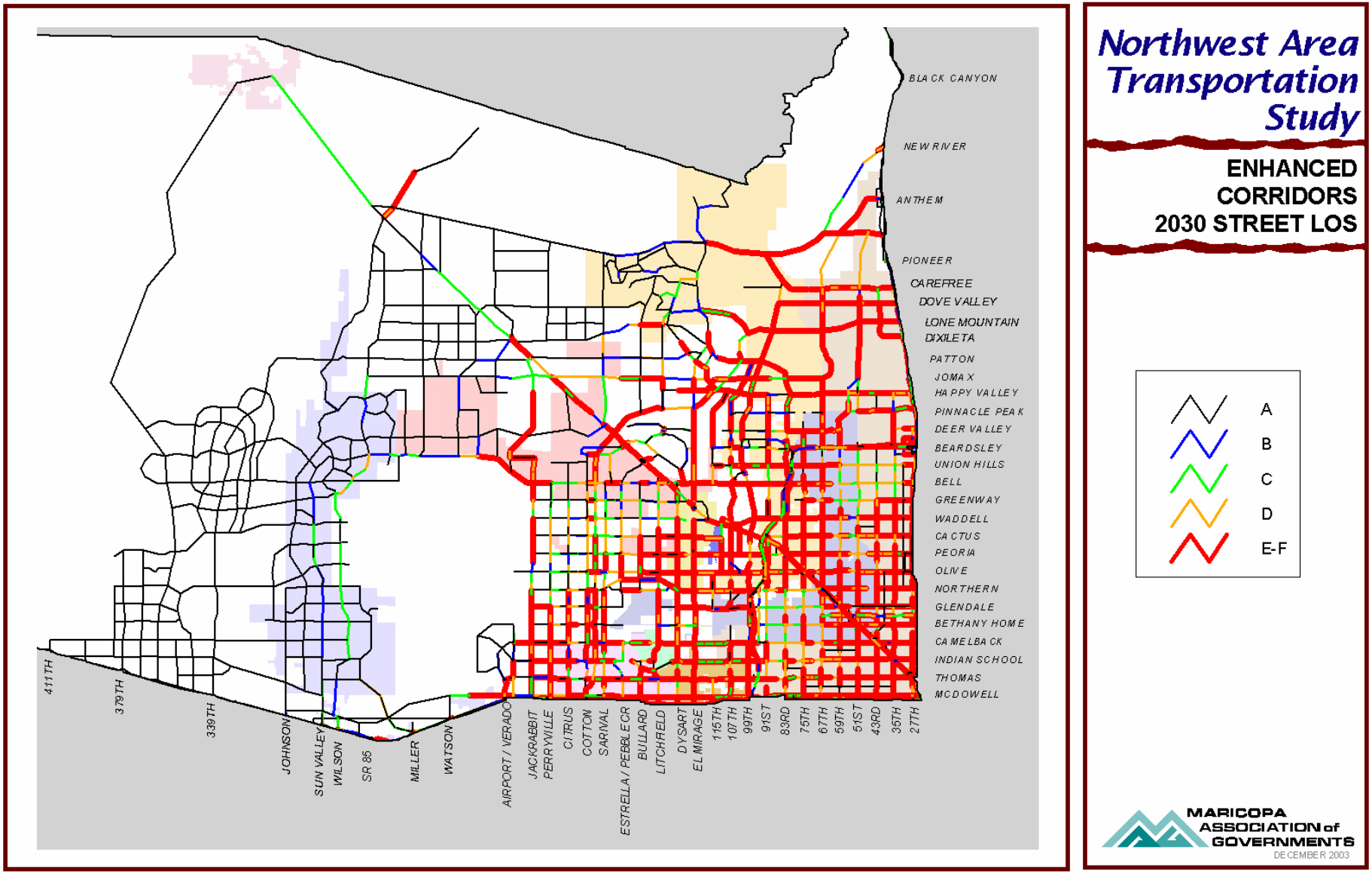
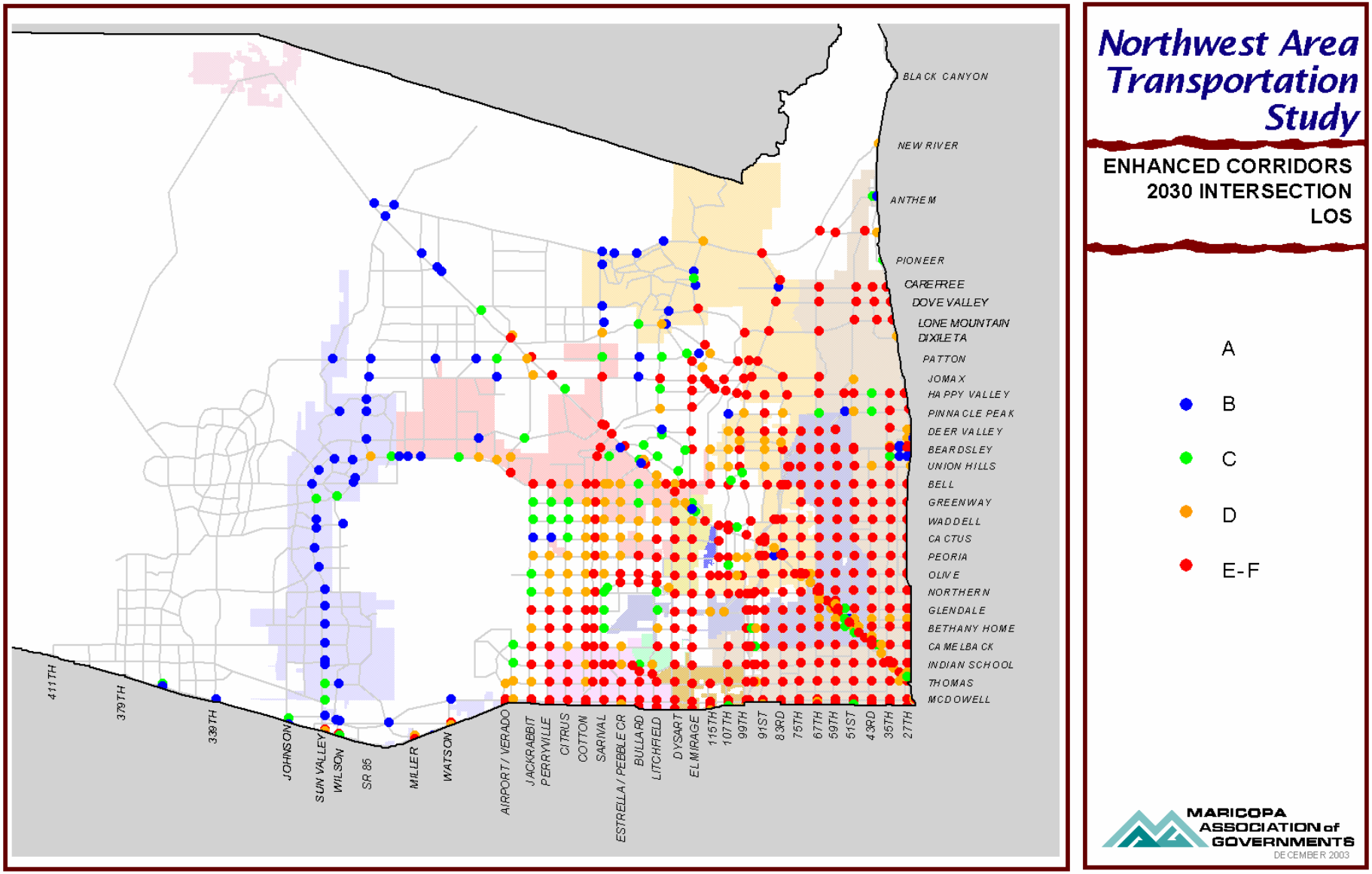


Figure 41: Enhanced Corridors Network: 2030 Intersection Level of Service



7.4 New Corridors Scenario

The New Corridors Scenario is designed to measure the effect of investing in major new freeway and expressway type facilities in the Northwest Valley. As the primary objective was to test the demand for higher capacity facilities, capacities modeled are high and are not intended necessarily to represent the capacities to be recommended. That decision depends on the demand identified and other factors including community support.

Two separate New Corridors scenarios were run, with the primary difference being the addition of capacity on I-17. Tested in these two scenarios for the Northwest were a freeway facility along the Loop 303 alignment, including a New River Road addition; an expressway connection between Loop 303 and Loop 101; an expressway connection along the Carefree Highway (SR 74) from Loop 303 to I-17; I-17 widening to twenty lanes (nine general purpose lanes and one HOV lane in each direction), from I-10 to Loop 101; and one significant new rural regional roadway, the Wickenburg Bypass from US 60 to US 93.

Loop 202 (South Mountain) was also added as a freeway (10 lanes) to the New Corridors Scenario. The South Mountain Corridor connects to I-10 within the Northwest study area, but otherwise falls outside the Northwest study area.

7.4.1 Key Additions in New Corridors Scenario

There are only a few elements in the New Corridors package, but they are significant in terms of the capacity they contribute to the plan. They are described ion the following paragraphs.

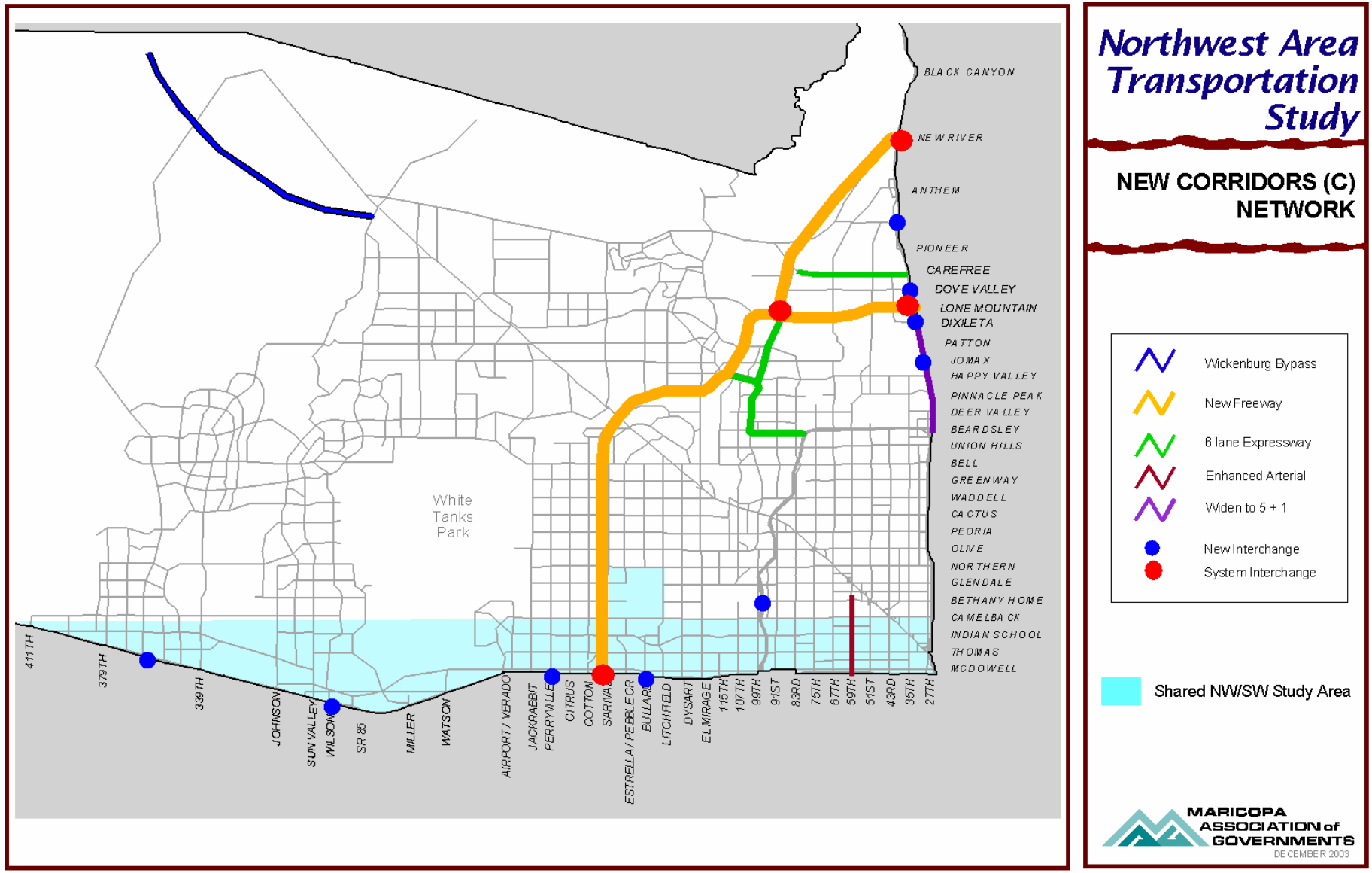
- **Loop 303 Freeway from I-10 to I-17** – As a freeway in the New Corridors scenario, Loop 303 provides improved access to a vast area outside Loop 101 and encircles some established communities and institutions such as Sun City and Luke AFB. The exact location of portions of the roadway alignment is currently under study. The MAG Regional Council adopted a motion for the connection to I-17 in their January 2001 meeting, as follows:

  "Approve the Lone Mountain Alignment as the preferred option for the Loop 303 connection with Interstate 17 in the next update of the Long Range Transportation Plan, to be constructed as a limited access parkway up to I-17 on the west side, with access only at major arterial intersections and for sufficient right-of-way to be purchased for a fully controlled access facility sometime in the future. In addition, the New River Alignment would be designated for further study in the Regional Transportation Plan."

  Consistent with the Regional Council action, Loop 303 was tested as a ten-lane freeway along the Loop 303 corridor between I-10 and I-17, connecting to I-17 along the Lone Mountain alignment and (as discussed further below) the New River Road study corridor. A system interchange was also provided for the intersection with Carefree Highway, SR 74.

- **New River Extension from Loop 303 to New River Road** – Also part of the Loop 303 discussion, the City of Phoenix has more recently indicated an interest in extending at least an arm of the proposed roadway to New River, near Anthem. It was modeled as a 10 lane facility, the same as Loop 303.

Figure 42: New Corridors (C) Network



- **Wickenburg Bypass** – A longstanding desire by the Town of Wickenburg is to eliminate commercial vehicle traffic from the historic downtown. ADOT has studied various alignments for a bypass, but a final decision has not yet been made. For purposes of this analysis, an alignment connecting SR 74 with the Bypass around the westerly side of the town was used. The Town of Wickenburg has recently indicated a preference for the CANAMEX Corridor along the Wickenburg Road/Vulture Mine Road alignment, connecting to US 93 north of Wickenburg, to be the ultimate bypass.

- **Carefree Highway Expressway** – The segment between I-17 and the proposed New River extension of the Loop 303 is expected to be subject to substantial growth. To accommodate substantial traffic volumes, this portion of SR 74 was tested as a 6-lane expressway. West of Loop 303, the roadway is identified as an ARC within a freeway right-of-way width.

- **Loop 101/Loop 303 Connector** – To address the possible implications of travel demand between the two freeways, a parkway or expressway connection was tested that would help to mitigate traffic increases and limit incursion into neighborhoods that might otherwise bear the burden of "cut through" traffic. The connection is shown in the vicinity of Beardsley Road connecting to Loop 101 and Lake Pleasant Road and Happy Valley Road connecting to Loop 303. This is the narrowest separation between the two Loop roadways where the highest propensity to "cross over" is likely to manifest itself during periods of heavy congestion.

- **59th Avenue** – This link is shown as an enhanced arterial to provide added north-south arterial capacity between I-10 and Grand Avenue. The intent was two-fold: to help eliminate the negative effects of a possible Loop 202 (South Mountain) connection to I-10 at or near 59th Avenue, and use of 59th Avenue as a higher capacity corridor consistent with alternatives tested in the MAG High Capacity Transit study. This link did not receive support from the Cities of Phoenix and Glendale.

- **I-17** – Two scenarios were modeled, designated as Option A and Option C. Under Option A, I-17 was widened to nine general purpose lanes and one HOV lane in each direction from I-10 to Loop 101. In Option C, I-17 in this section was left the same as in the enhanced corridors scenario (four plus one north of Dunlap Avenue, and three plus one south of Dunlap). In both Option A and Option C, I-17 north of Loop 101 was left the same as in the Enhanced Corridors scenario (widened to five general purpose lanes plus one HOV lane to SR 74, and widened to four general purpose lanes plus one HOV from SR 74 to Anthem Way).

- **Various freeway interchanges** – Additional freeway access points are included to better serve areas of new growth.

Table 23: New Corridors Centerline Miles and Miles by Facility Type

	Jurisdiction		MPA	
PLACE	Centerline Mi	Lane Mi	Centerline Mi	Lane Mi
AVONDALE	34	165	38	181
BUCKEYE	154	700	408	1,793
EL MIRAGE	28	151	26	134
GLENDALE	168	792	251	1,202
GOODYEAR	41	201	64	306
LITCHFIELD PARK	10	44	17	81
PEORIA	178	824	246	1,143
PHOENIX	305	1,375	355	1,565
SURPRISE	124	598	314	1,507
TOLLESON	8	41	3	17
WICKENBURG	14	58	27	109
YOUNGTOWN	5	20	6	28
MARIC CO	810	3,658	124	559
TOTAL	**1,879**	**8,626**	**1,879**	**8,626**
			STUDY AREA	
Facility Type			Centerline Mi	Lane Mi
Freeway			140	1,063
HOV			97	215
Arterial			1,643	7,348
TOTAL			**1,879**	**8,626**

Table 24: Cost of New Corridors Improvements*

ELEMENT	NEW LANE MILES ADDED	AVG / HIGH 2030 VOLUME (thousands)	NUMBER OF LANES NEEDED** (each way)	COST (millions)
Loop 303	206	217 - 250	5 (4+1)	$1,008
New River Extension	72	77 - 132	3	$570
59th Avenue	-	40 - 52	3 (exist.)	$15
Carefree Highway	-	49 - 66	3	$12
101/303 Connector	-	35 - 75	3	$22
Wickenburg Bypass	100	Less than 10	2	$220
New TIs I-10/I-17	-	NA	-	$128
TOTAL				$1,975

* *Based on Option C for I-17, which is the same as the Enhanced Corridors scenario for I-17. New Corridors Option A, in which I-17 is widened substantially between Loop 101 and I-10, is discussed later.*

** *A minimum 4 lane cross-section (2 lanes each direction) was assumed for safety reasons.*

Figure 43: New Corridors Option C: 2020 Traffic Volumes

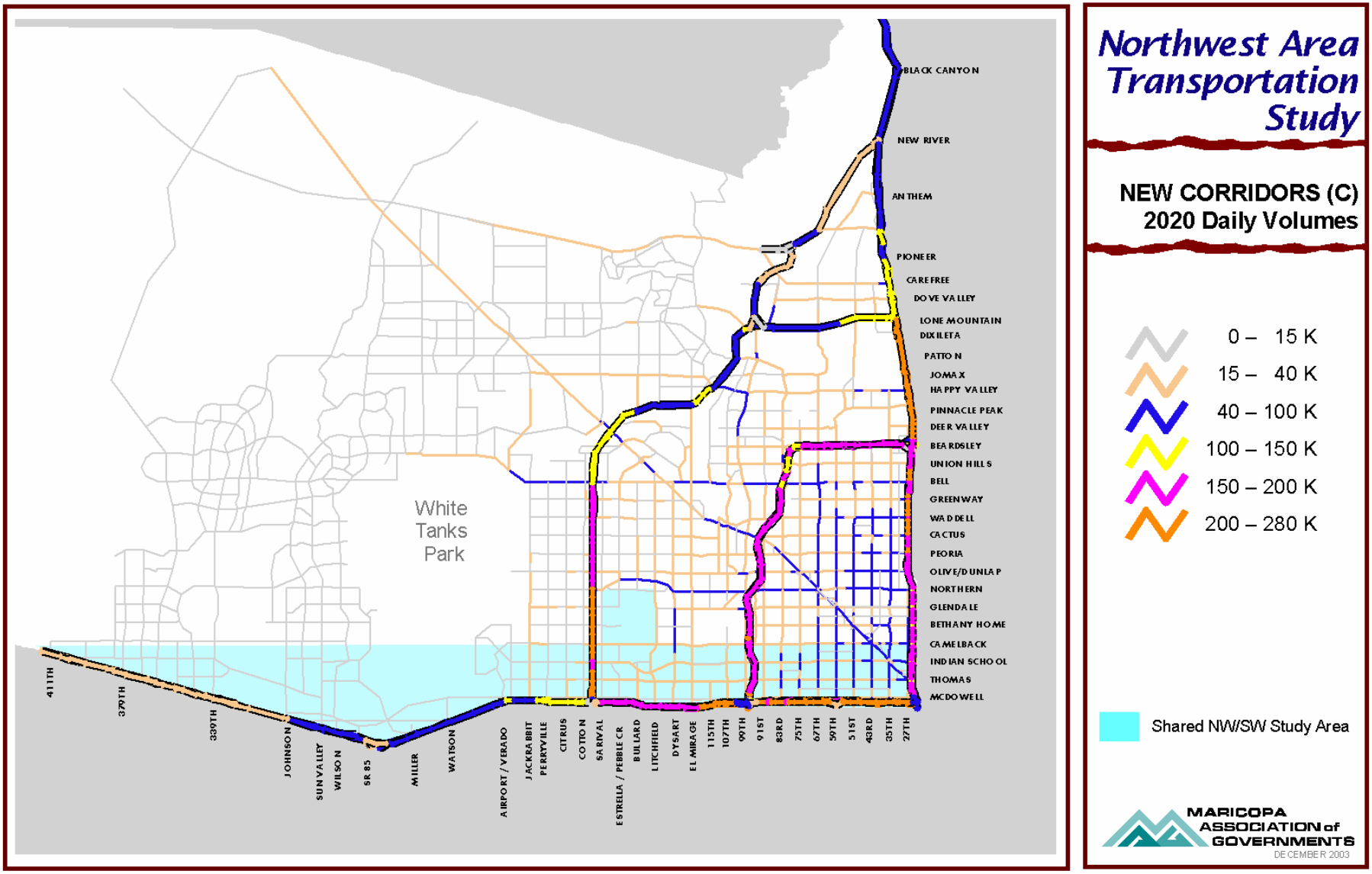


Figure 44: New Corridors Option C Network: 2030 Daily Volumes

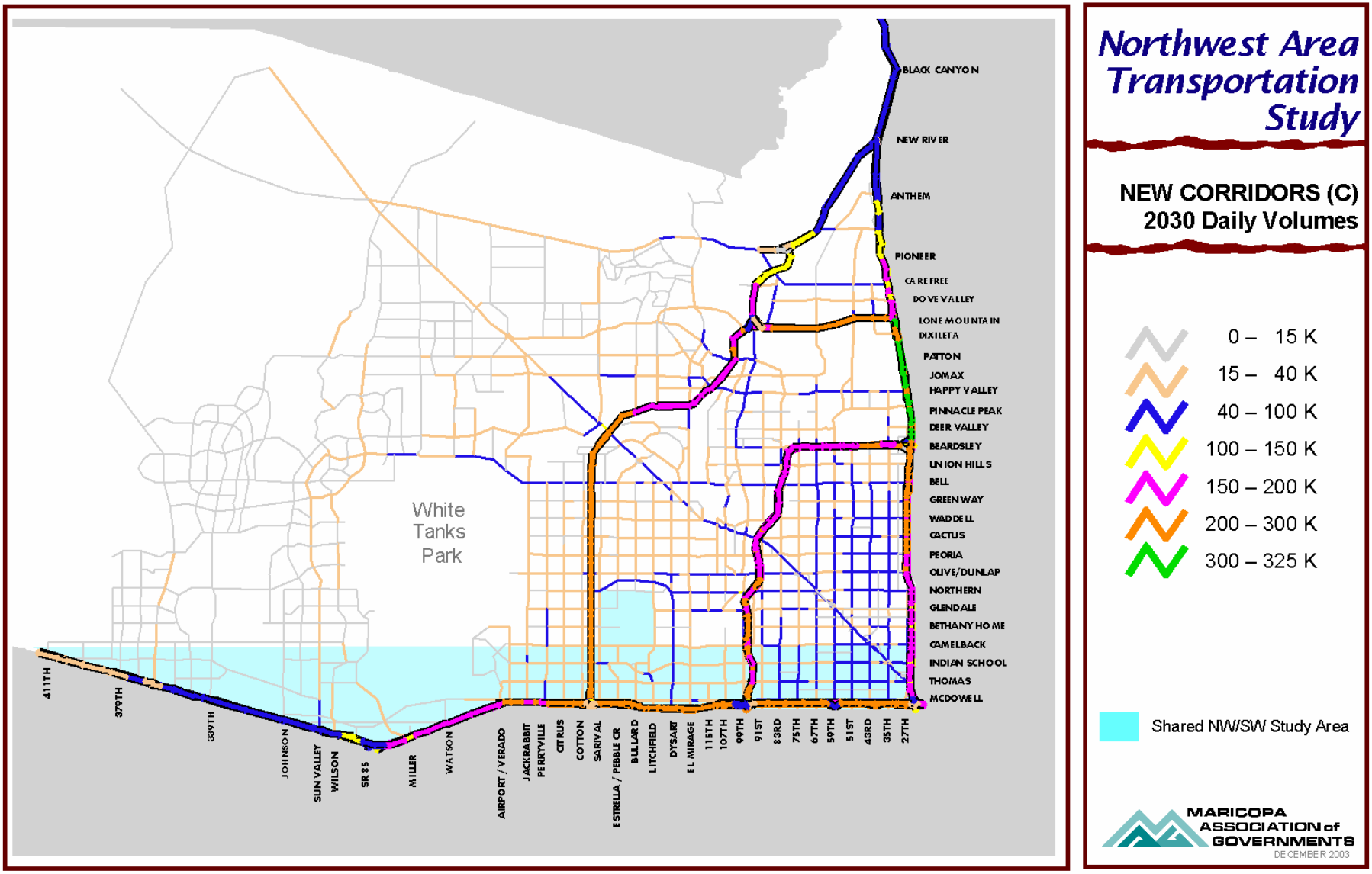


Figure 45: New Corridors Option C Network: 2030 Freeway Level of Service

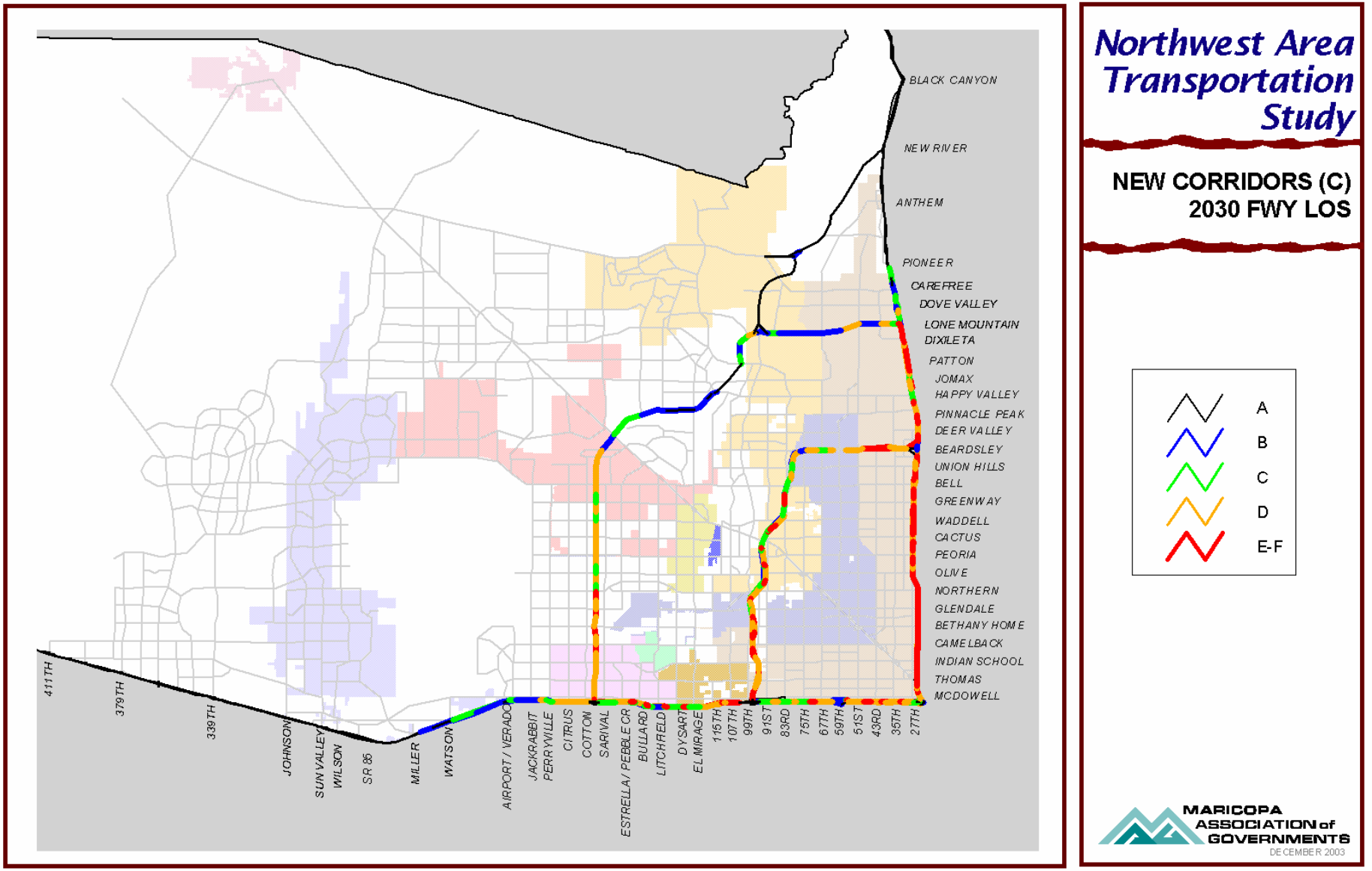


Figure 46: New Corridors Option C Network: 2030 HOV Level of Service

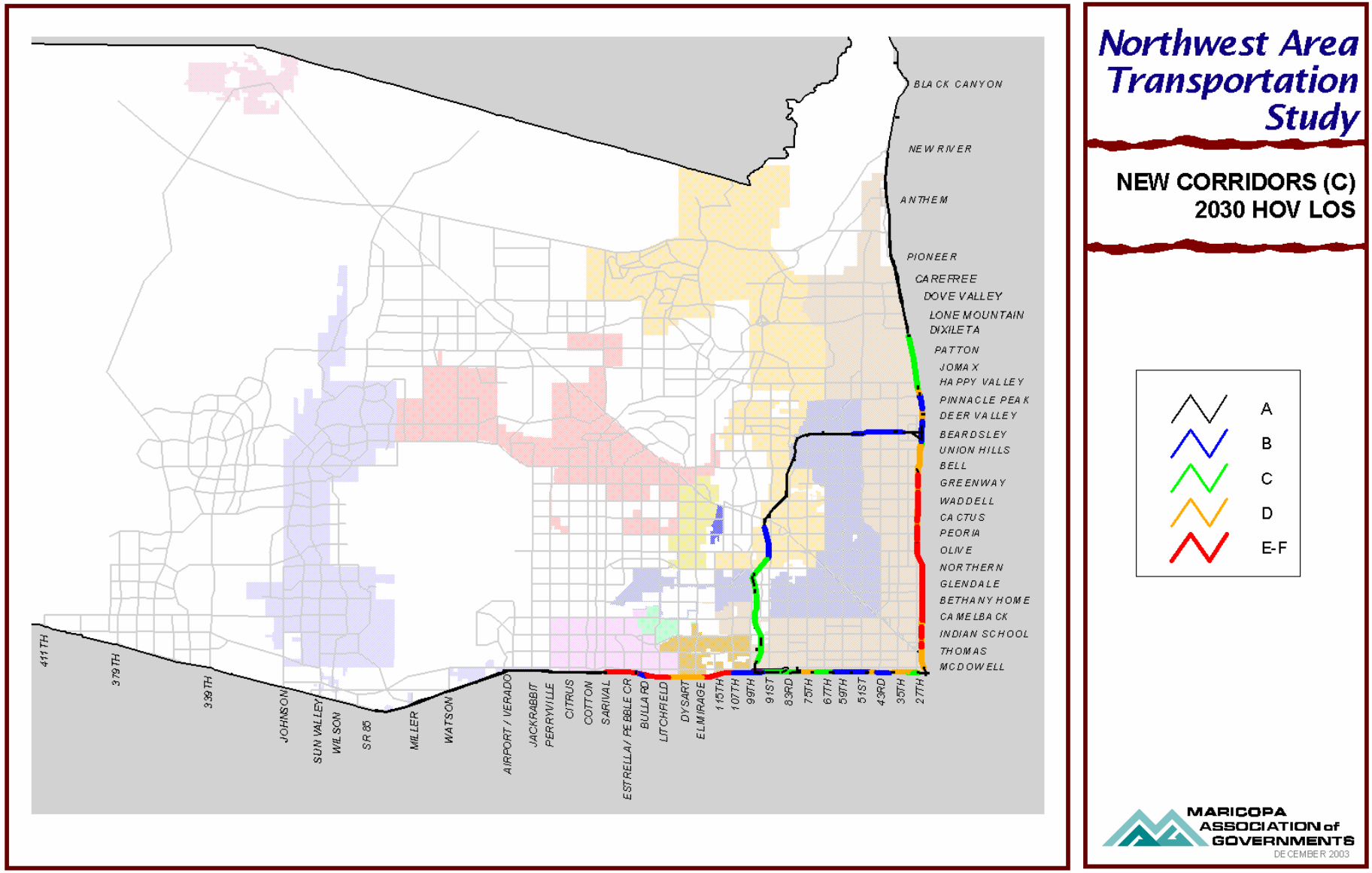


Figure 47: New Corridors Option C Network: 2030 Arterial Segment Level of Service

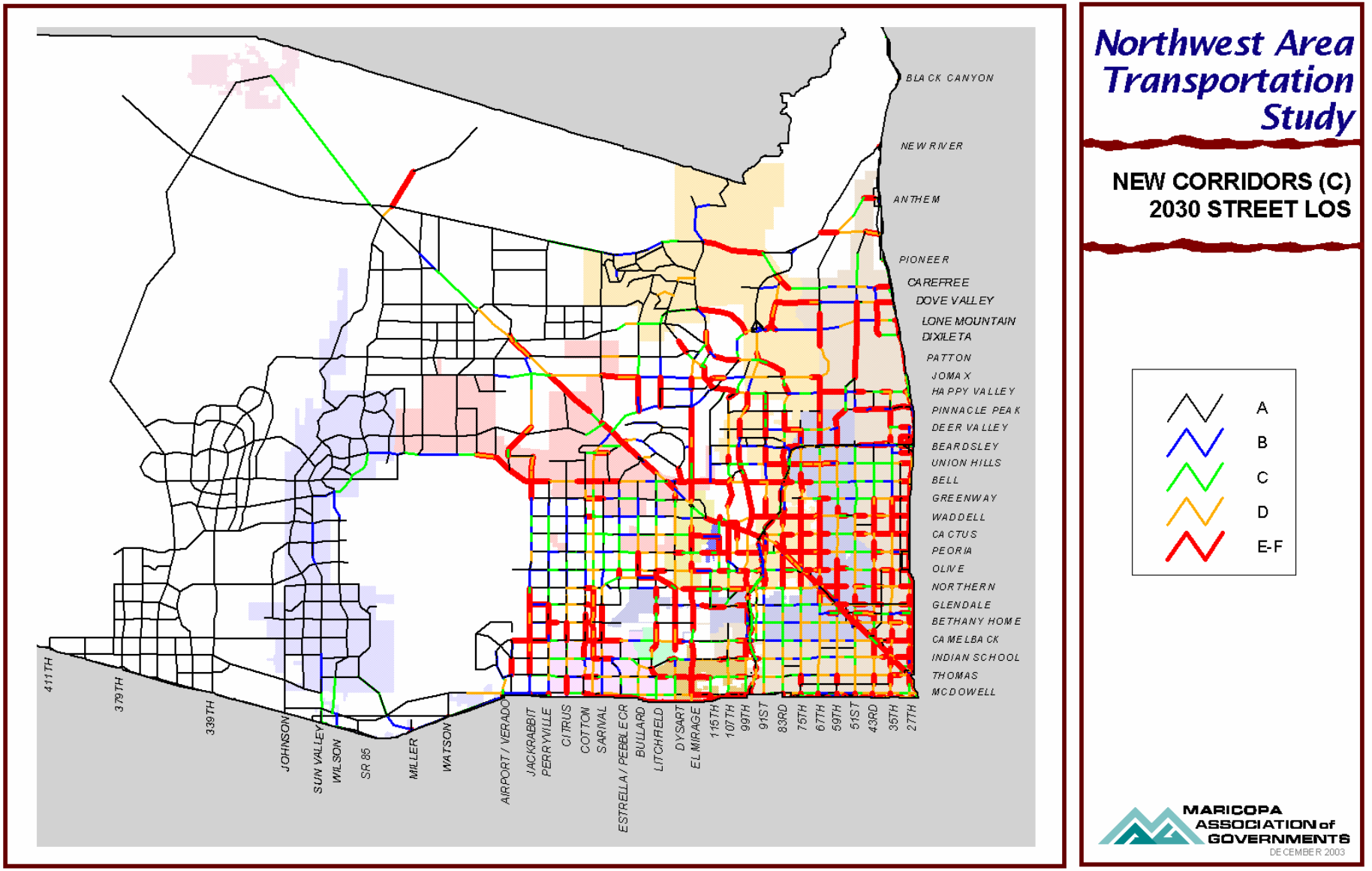
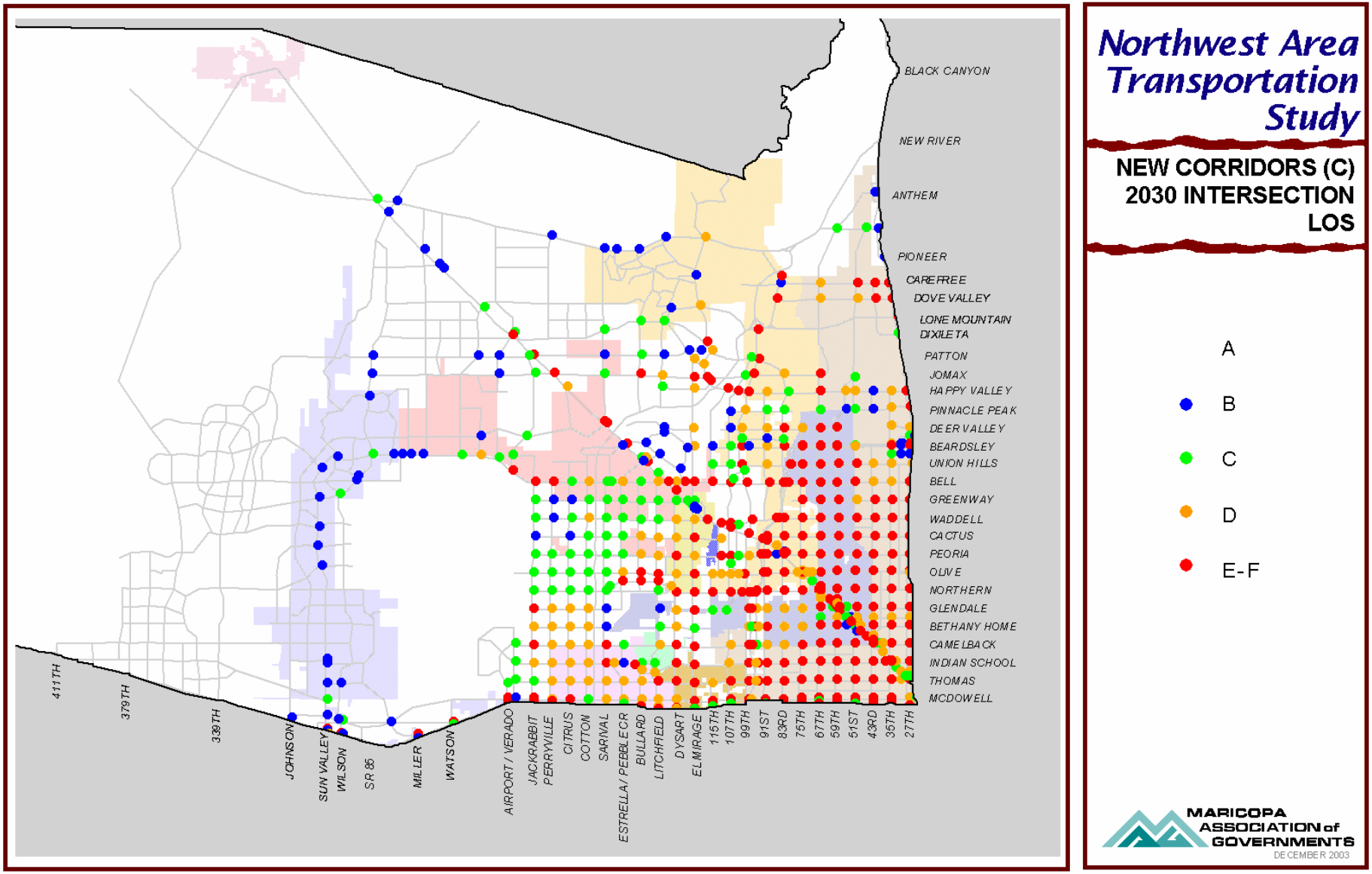


Figure 48: New Corridors Option C Network: 2030 Intersection Level of Service



7.4.2 New Corridors Option A

One additional option, considered in order to measure its impact on the overall Northwest Valley system, was a major reconstruction of I-17 between I-10 and Loop 101. Projections of high traffic volumes in the future indicate capacity is inadequate to carry the demand that can be expected as the region grows. By 2030, volumes on I-17 greatly exceed any currently contemplated number of lanes. Option A proposes to increase the number of lanes on I-17 from the current (and LRTP proposed) 3+1 south of Dunlap and the proposed 4+1 north of Dunlap to a total of 9+1 throughout the stretch.

Part of the reason for the test is to measure the effect it would have on the overall system. Another is recognition that the cost of adding even one or two lanes will be exorbitantly costly and that a major reconstruction would derive substantially more benefit for higher, but potentially comparable dollars. The cost of the project was not explicitly calculated because a 20-lane freeway can be organized in many configurations. Among the possibilities are a double-decked roadway that would require a substantially smaller footprint and designated lanes for specific purposes (e.g., truck lanes, through lanes, etc.)

The cost has been set at $1 billion + recognizing this would involve a major expense whether an expansion at grade or as a multi-deck option.

The following maps show the effect of the 20 lane freeway on the overall roadway system. As expected, levels of service improve with the increase in capacity on the major system constriction. Though traffic volumes on I-17 rise to over 420,000 ADT, the LOS on all freeways in the Northwest Valley is dramatically improved and many of the nearby arterials also function at a much higher level. There are still some trouble spots, however, north of Loop 101 on I-17 where the rapid loss of lanes in the modeled alternative causes a bottleneck and in the area between Bethany Home and Cactus Roads where intermittent LOS F segments still appear. If this option is selected for further analysis in the RTP process, then additional widening of I-17 north of Loop 101 would be needed.

7.4.3 Summary of Roadway Modeling Options

The effect of adding capacity to the highway system is clearly evident in the results shown in Table 26. Congestion levels in 2000 deteriorate dramatically toward 2030 under the first modeling package which focuses primarily on expanding the arterial network. As major projects such as new and widened freeways are added, conditions gradually improve. The number of lane miles added under each scenario in NWATS is substantial. Total lane mile growth, including arterials and freeways, is nearly 240%. Still, the number of congested intersections and lane miles as well as hours of delay, increase substantially in response to anticipated growth in land use.

Table 25: Summary of Roadways Modeling Packages

Measure	2000	2020				2030			
		Future Base	Enhanced	New Corridors (A)	New Corridors (C)	Future Base	Enhanced	New Corridors (A)	New Corridors (C)
Centerline Miles									
FREEWAY	114	135	140	178	196	135	140	178	196
HOV	22	27	97	91	97	27	97	91	97
STREET	993	1,643	1,643	1,643	1,643	1,643	1,643	1,643	1,643
TOTAL	1,155	1,809	1,879	1,912	1,937	1,809	1,879	1,912	1,937
Lane Miles									
FREEWAY	567	710	1,063	1,655	1,630	710	1,063	1,655	1,630
HOV	545	54	215	194	217	54	215	194	217
STREET	3,146	7,197	7,348	7,245	7,245	7,197	7,348	7,245	7,245
TOTAL	3,859	7,919	8,626	9,094	9,092	7,919	8,626	9,094	9,092
Daily VMT									
FREEWAY	9,200,000	14,900,000	19,000,000	25,000,000	22,700,000	14,800,000	21,600,000	29,900,000	29,400,000
HOV	370,000	800,000	1,900,000	2,100,000	1,500,000	1,000,000	3,000,000	2,000,000	2,400,000
STREET	11,400,000	29,900,000	27,500,000	22,100,000	23,000,000	43,800,000	41,300,000	33,400,000	34,400,000
TOTAL	21,000,000	45,600,000	48,400,000	49,500,000	47,200,000	60,000,000	66,000,000	66,400,000	66,200,000
LOS (number of intersections)									
D	77	117	120	131	114	75	81	90	93
E and F	72	263	217	126	159	456	409	261	291
% congested	31%	52%	48%	46%	45%	62%	55%	41%	43%
Congested Lane Miles									
FREEWAY	42	202	119.81	46.77	75.8	317	306	184	217
HOV	--	23.8	12.3	1	8.8	33	75	21	29
STREET	222	1,052	556	263	356	2,414	1,851	832	937
% congested	7%	16%	8%	3%	5%	35%	26%	11%	13%
Hours of Delay									
FREEWAY	47,043	322,000	176,300	58,792	99,099	1,153,623	584,933	231,862	288,490
HOV		14,000	4,474	213	3,129	61,286	40,414	13,133	13,542
STREET	110,850	630,600	325,389	166,091	203,707	3,790,770	1,604,885	515,314	615,140
Average Speed									
FREEWAY	57	40	47	55	53	21	35	49	45
HOV	60	57	60	61	60	41	56	51	58
STREET	29	26	29	29	29	16	23	28	26

Figure 49: New Corridors Option A Network (same as Option C except for I-17 widening)

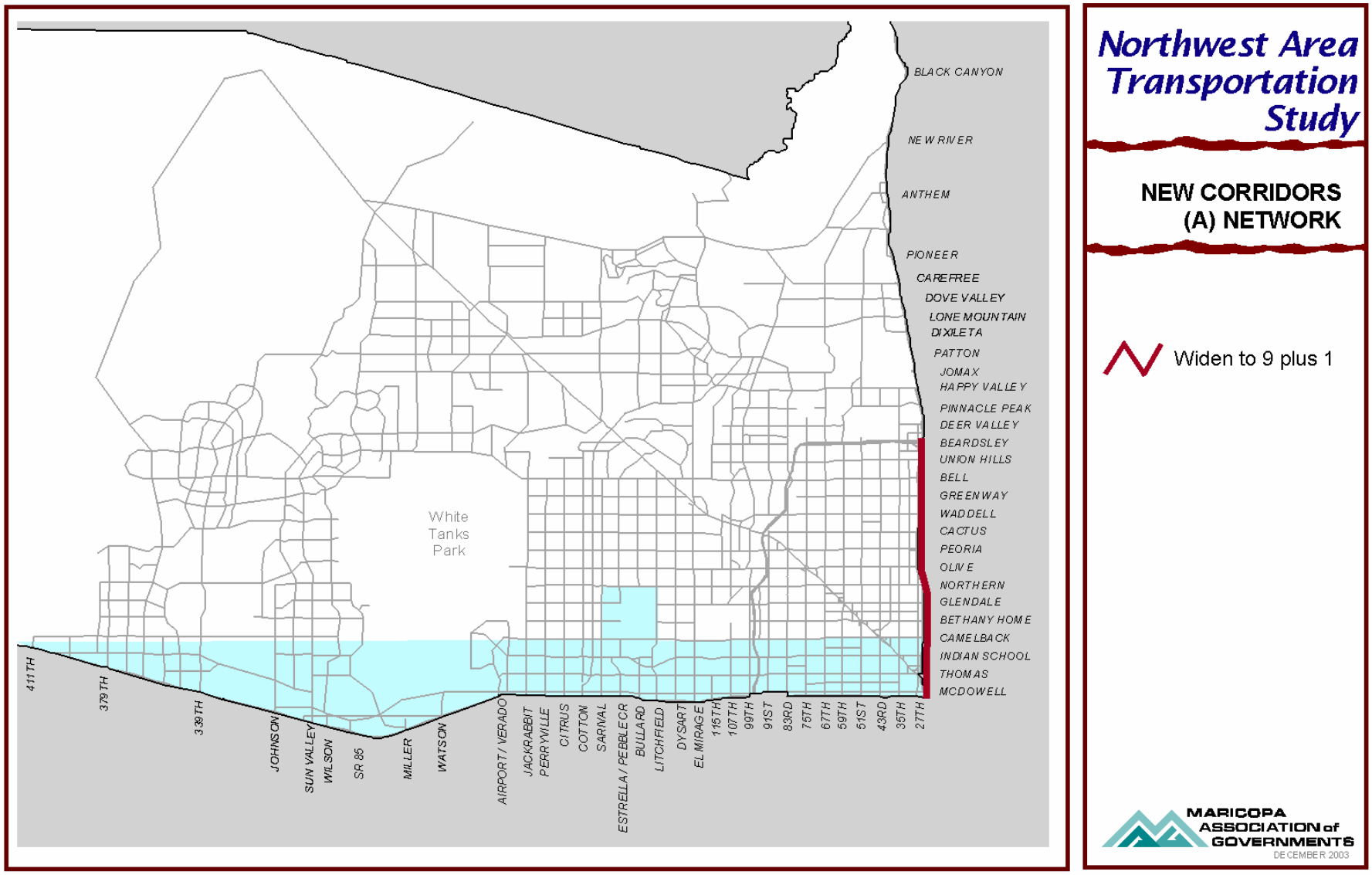


Figure 50: New Corridors Option A Network: 2030 Daily Volumes.

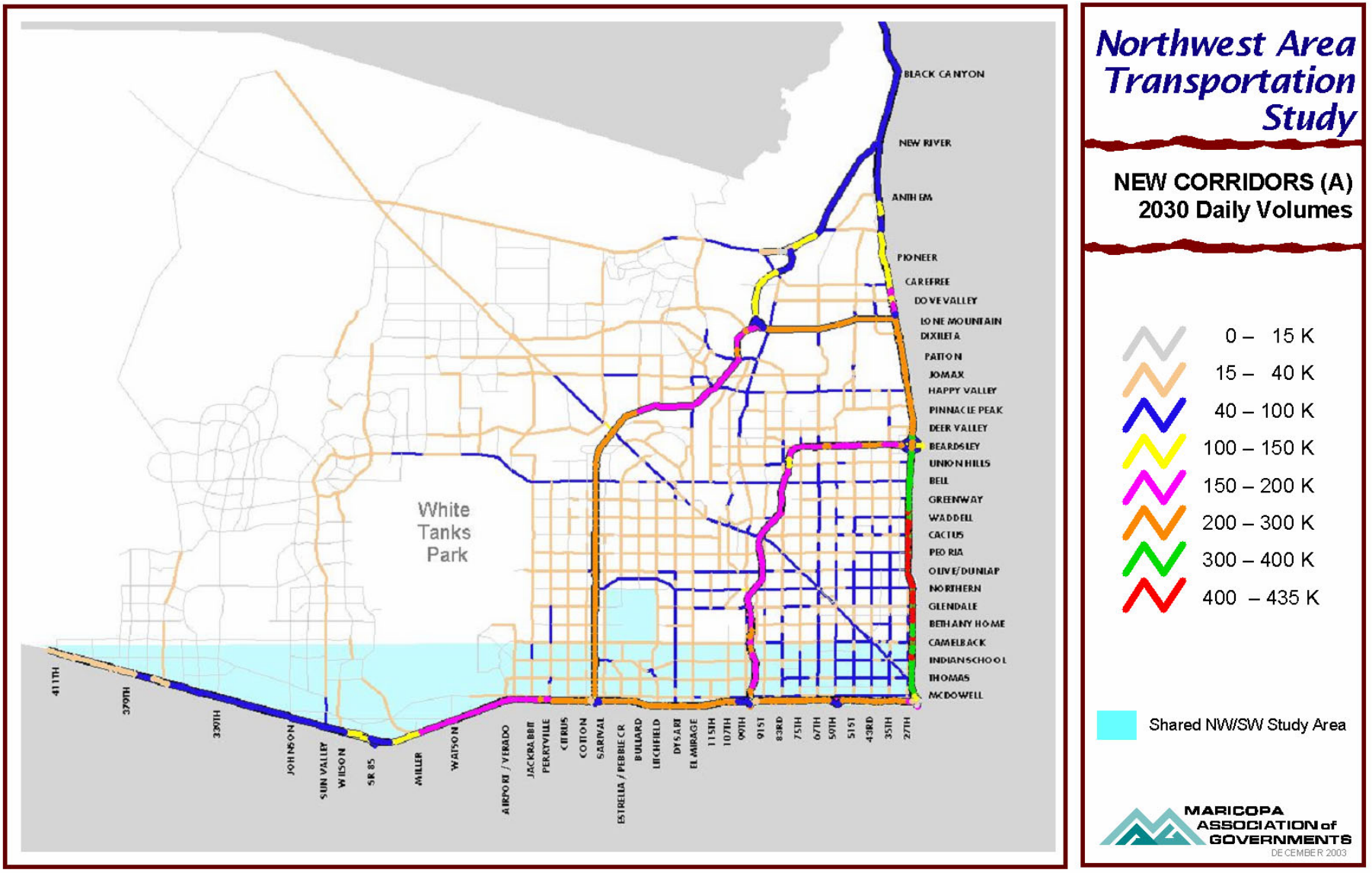


Figure 51: New Corridors Option A Network: 2030 Freeway Level of Service

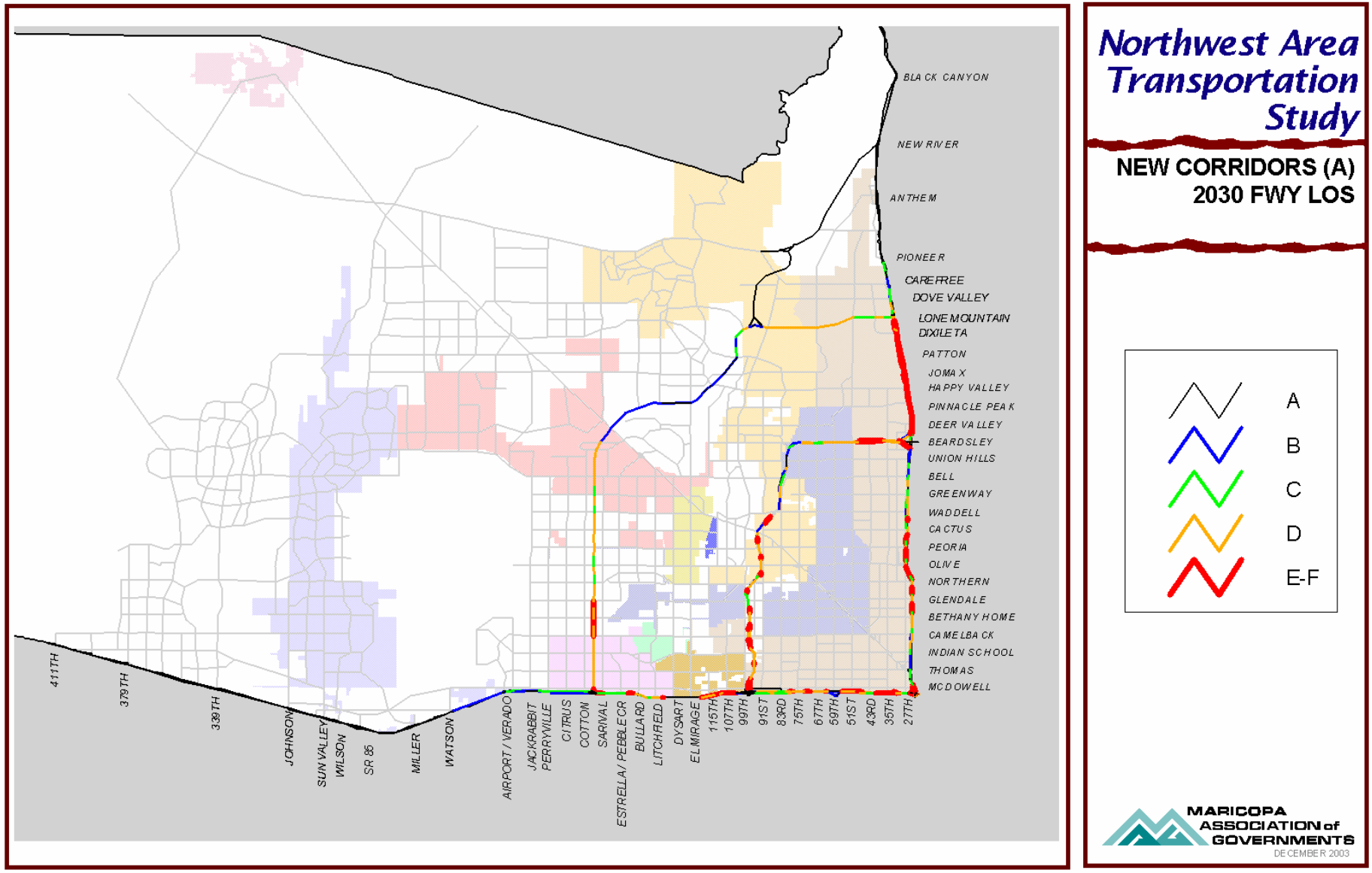


Figure 52: New Corridors Option A Network: 2030 HOV Level of Service

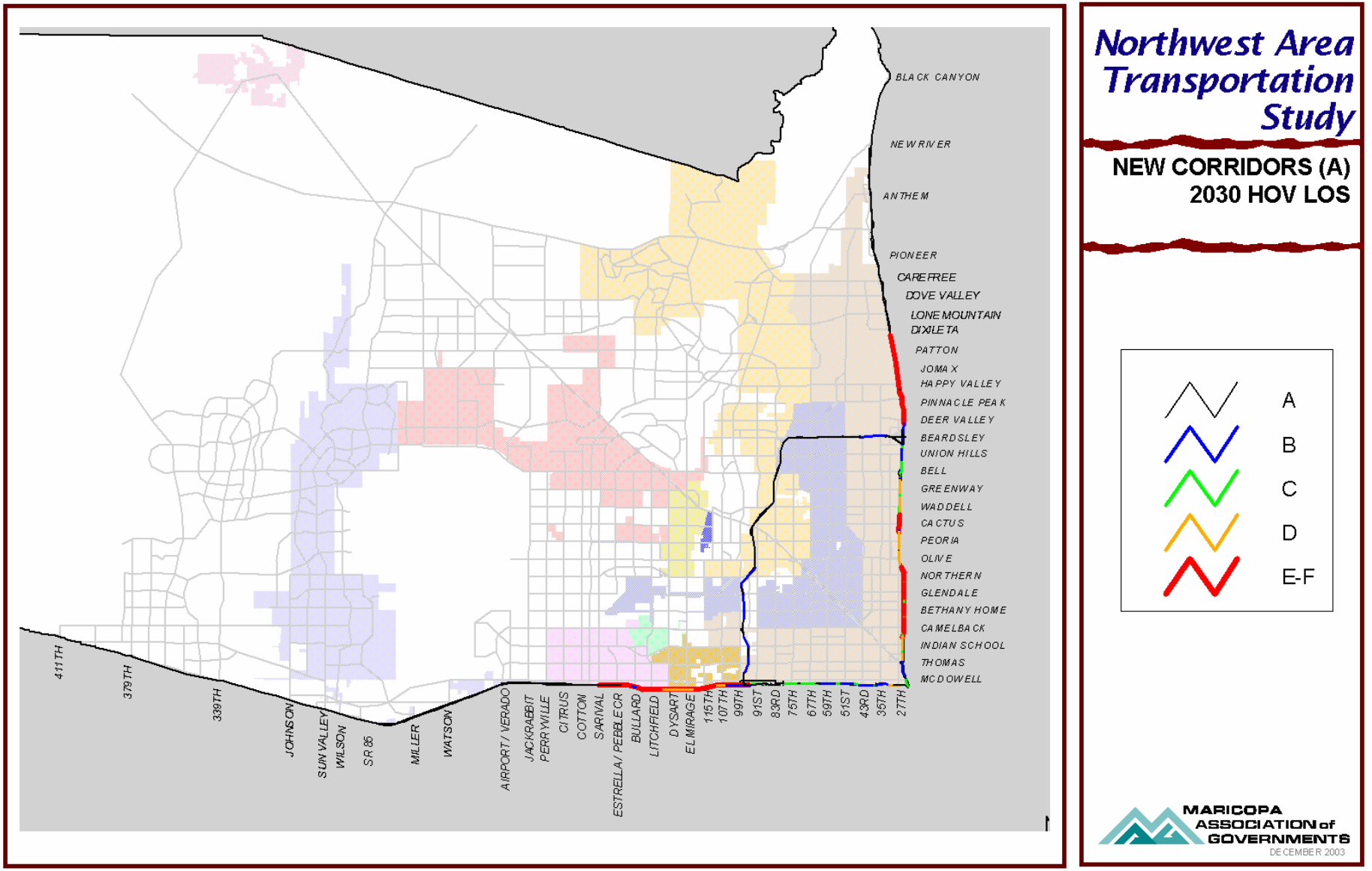


Figure 53: New Corridors Option A Network: 2030 Arterial Segment Level of Service

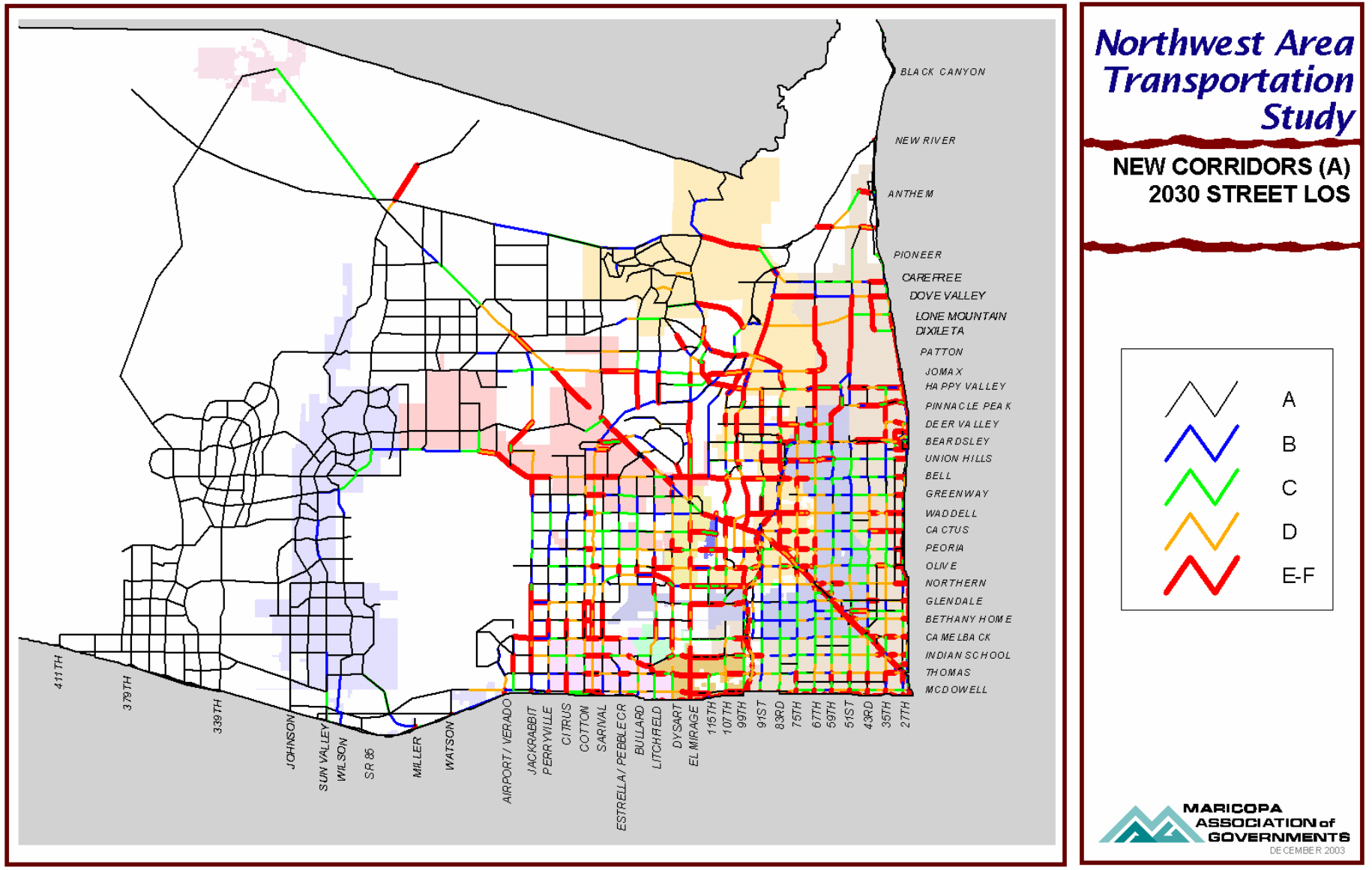
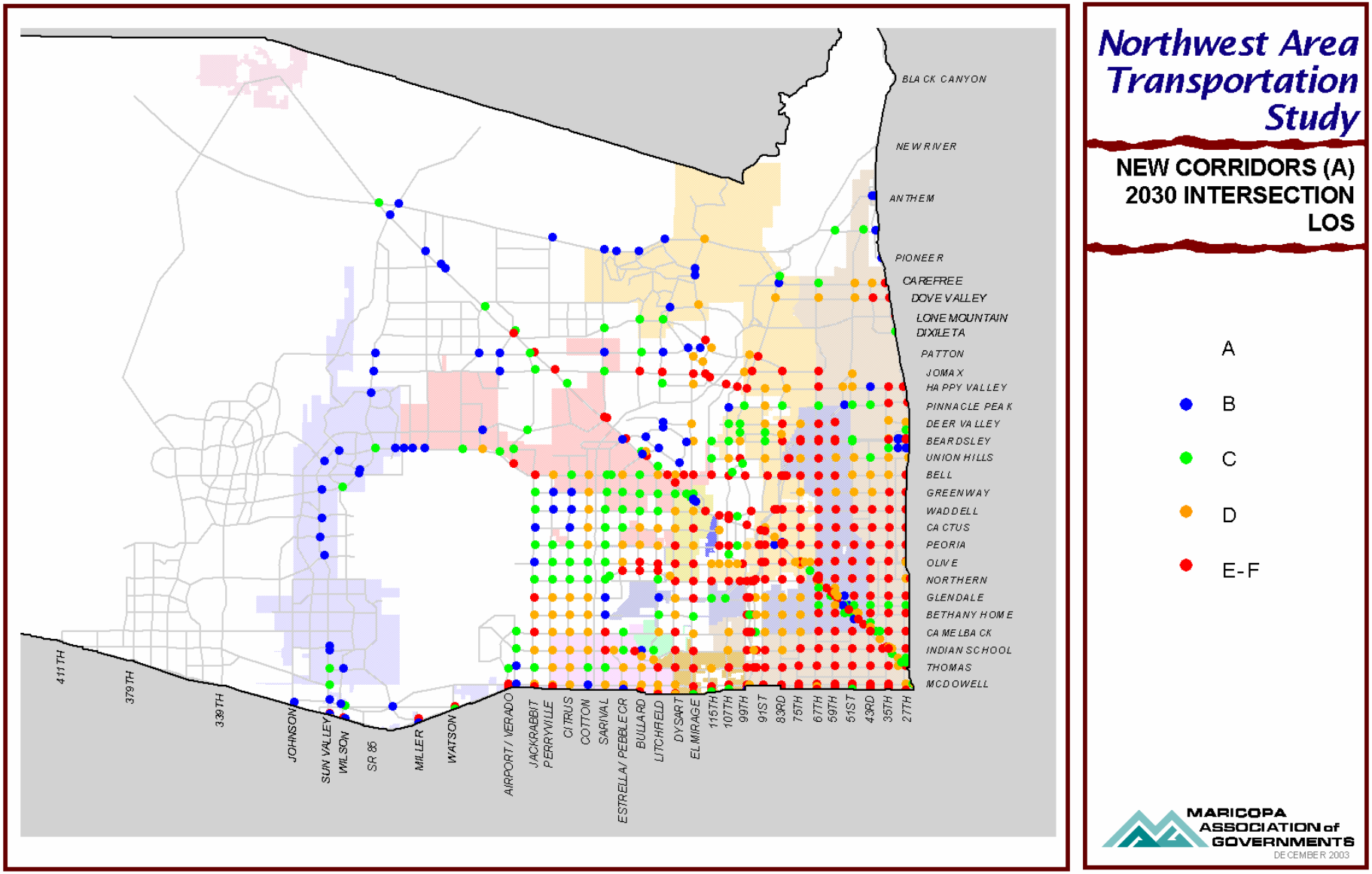


Figure 54: New Corridors Option A Network: 2030 Intersection Level of Service



Some representative figures indicate the challenge to transportation plans in the Northwest Valley:

- In 2030, VMT increases between 284% and 315% (depending on package) over 2000 which more than offsets the percent increase in added lane miles during that period.
- Congested intersections rise from 31% in 2000 to over 62 % in the Future Base package, though the number recovers as new facilities are added to about 43% under the New Corridors option.
- Hours of delay reacts similarly to congested intersections in that it rises from 157,893 hours in 2000 to 5,005,679 in the Future Base and settles back to 760,310 under the best 2030 scenario, New Corridors.

In the absence of substantially more capacity in the roadway system or a major contribution from proposed transit improvements, conditions will very likely worsen over time in the general area. Results from the transit model runs (not yet available) could give an indication of transit's contribution.

7.5 General Safety Assessment

Over the years, traffic count data and crash data have clearly indicated that the number of motor vehicle crashes increase proportionately with increasing vehicle miles of travel (VMT). Although the relationship between the number of crashes and the amount of travel of exposure is not exactly linear, for a planning level safety assessment involving a comparison of the relative safety between planning scenarios, a linear relationship was assumed to be adequate.

This methodology utilizes traffic crash rates, computed either as the number of crashes per 100 million VMT (on continuous highway segments) or crashes per 100 million entering vehicles (at intersections), to estimate the total number of crashes that we may expect to occur in a future year based on a forecast for the amount of travel in that year. This analysis can be further refined by utilizing particular crash rates generated for different crash severities such as Fatal, Injury or Property Damage Only, and also for different types of road facilities and intersections. Freeway and arterial crash rates used in this assessment to generate future expected crash frequencies were obtained from published literature for other similar urban regions. Similar statistics for the MAG region are being developed by MAG and are not available at the current time.

Table 26 depicts the estimated number of crashes for each of the scenarios modeled and the associated distribution of crash severities for the amount of travel predicted across the transportation network for each scenario. The Current Base for 2002 is based on the same crash rates used to estimate future year crashes and do not reflect the actual totals for crashes in the MAG region for calendar year 2002. When more current statistics and information on road safety in the MAG region become available it will be possible to generate an actual Base Year for studies of this nature. Therefore, projections generated for the Current Base are only for comparison purposes.

The comparison of the Future Base and the three scenarios against the Current Base show varying impacts on roadway safety due to different improvements to the roadway system assumed for each scenario. As expected, there are substantial increases in the total number of crashes and within each crash category (i.e., fatal, injury, property-damage-only) due to increased VMT on the highway system. For example, for the two

base cases the total number of freeway crashes is expected to increase from 4,920 in 2002 to 8,761 in 2030, an increase of 78 percent. A comparison of total arterial road segment crashes shows an increase of 168 percent.

For the 2030 Future Base assumed network conditions, the estimated number of crashes is an increase of 122 percent over the 2002 Current Base. An examination of the Enhanced, New Roadways and Option A scenarios clearly depict that each of these scenarios will produce an improvement in overall road safety in comparison to the Future Base. Most of these improvements are due to more travel occurring on the freeway system as opposed to the arterial system. Although the total number of crashes on freeways appear to have increased, significant reduction in crashes are affected on arterial roadway segments and at intersections.

Projections for systemwide safety improves as additional freeway and expressway/parkway capacity are constructed as reflected in the Enhanced and New Corridors scenarios. Results indicate that building more freeways shifts traffic to freeways, increasing the relative number of accidents on freeways, but reducing the total number.

In conclusion, a comparison of both total, and fatal and injury crashes for New Corridors (Options A and C scenarios) indicates that these two scenarios are the best options from a safety viewpoint. They will lead to almost identical safety improvements over the Future Base scenario, with the New Corridors Option A scenario slightly ahead due to fewer projected injury crashes.

Table 26: Regional Roadway Segment Crash Projections

	Current Base	New Corridor A		New Corridor C		Future Base		Enhanced	
	2002	2020	2030	2020	2030	2020	2030	2020	2030
Freeway									
Fatal	22	53	63	51	62	33	36	38	42
Injury	1,418	3,781	4,670	3,649	4,562	2,298	2,516	2,644	2,949
PDO	3,480	9,340	11,559	9,012	11,292	5,668	6,209	6,521	7,277
Total	4,920	13,174	16,292	12,712	15,916	7,999	8,761	9,203	10,268
Arterial									
Segment Fatal	74	121	155	123	156	148	192	142	184
Segment Injury	6,699	11,149	14,299	11,295	14,380	13,717	17,972	12,756	16,709
Segment PDO	13,361	22,328	28,712	22,639	28,901	27,406	35,892	25,534	33,478
Segment Total	20,134	33,598	43,166	34,057	43,437	41,271	54,056	38,432	50,371
Intersection	15,219	20,737	23,054	20,838	23,228	23,083	26,411	22,869	25,878
Total	**40,273**	**67,509**	**82,512**	**67,607**	**82,581**	**72,353**	**89,228**	**70,504**	**86,517**

Table 27: Regional Traffic Volume Projections

	Current Base	New Corridor A		New Corridor C		Future Base		Enhanced	
	2002	2020	2030	2020	2030	2020	2030	2020	2030
Freeway VMT[7]	2,179	5,397	6,514	5,227	6,372	3,341	3,635	3,849	4,257
Arterial Intersection NEV	15,219	207,955	297,207	300,652	365,572	359,504	448,461	340,453	423,824
Arterial Segment VMT[8]	4,002	6,610	8,553	6,745	8,659	8,047	10,413	7,685	10,037

[7] Million vehicle miles traveled
[8] One hundred vehicles

7.6 Multimodal Considerations

This option is designed to reflect the full buildout of the transportation system in support of a higher projected level of socio-economic development. It will include all major new roadways and major new transit service including the results of the MAG High Capacity Transit Study and the RPTA Regional Transit Systems Study. The roadways will have been evaluated in previous runs, but the complementary transit components will be evaluated for the first time in the overall network. The results will indicate how well the combination of options serves the mobility needs of the Northwest Valley.

The Total Scenario has not been modeled for this analysis because the transit elements were under development. Individual projects of significance shown in the MAG High Capacity Transit Study and the RPTA Regional Transit Systems Study have been identified as part of the overall transportation plan and form the basis of the information contained in this section.

The key elements of the transit system for the Northwest Valley are described below.

7.6.1 High Capacity Transit *(from MAG High Capacity Transit Study-HCTS)*

The HCTS was undertaken to investigate the need for high capacity transit in the region as congestion on roadways worsens. It resulted in a number of corridors that appear to justify further consideration in terms of demand. Each corridor is intended to show the potential high capacity performance within the corridor and the roadway name is identified only as a means of placing the corridor geographically. The actual location of a high capacity line could be anywhere within the broader corridors shown in Figure 55.

Among the projects that are likely to receive further consideration are:

Light Rail/Dedicated BRT

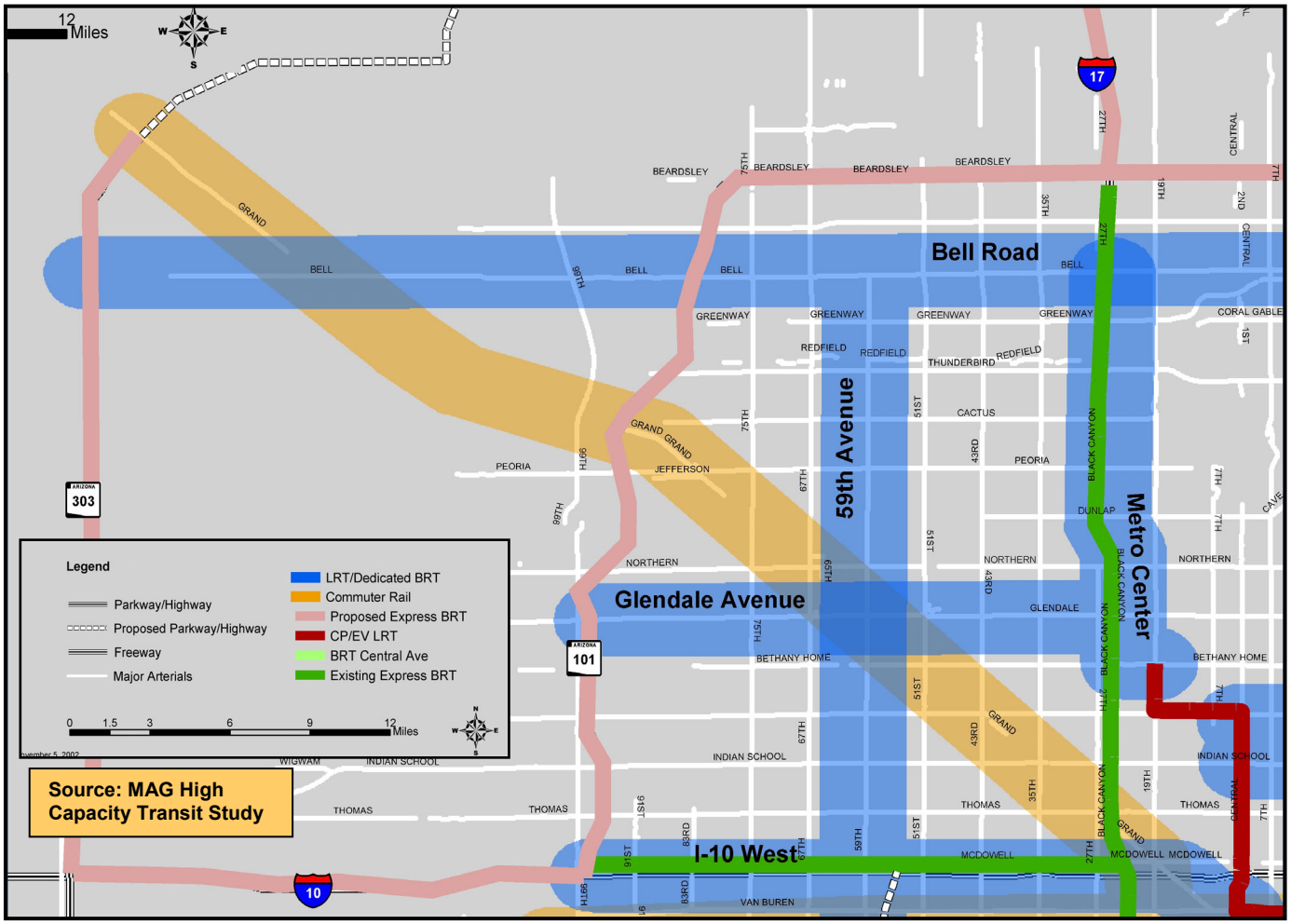
Light rail is identified in the HCTS where it is an extension of another light rail line. In most other corridors, high capacity corridors would accommodate either LRT or Dedicated BRT depending on demand and the results of further study. For clarity, it should be noted that BRT is proposed in two forms: 1) Express BRT which uses freeway corridors and is similar to express bus service and 2) Dedicated BRT which relies on separated guideways that could be on street to expedite travel and compete more effectively with the automobile. If not indicated otherwise, BRT refers to Dedicated BRT.

- I-17 Extension – this would take the Central Phoenix/East Valley LRT line beyond MetroCenter along I-17 as far as Bell Road.
- I-10 line – is being evaluated as a new LRT line along or within the right-of-way of I-10.
- City of Glendale Extension – would link Glendale to the Central Phoenix/East Valley LRT line and is identified in the Go Glendale program.
- Bell Road – This would provide for high capacity service, either LRT or BRT, along the major east-west arterial corridor in the Northwest Valley. Model projections indicate very high potential for this corridor.
- 59th Avenue – In keeping with the need to offer more capacity between I-10 and Bell Road in Glendale, this link has the potential to be an effective high capacity service and is considered for either LRT or BRT.
- Loop 101 – An Express BRT route is shown along Loop 101.

- Loop 303 south of Grand Avenue – Express Bus
- I-10/I-17 – Express bus is shown beyond the termini of LRT/BRT services. Additional lines may be considered in the RTP process.

Commuter rail is included in the Grand Avenue Corridor along the existing BNSF tracks as far as Surprise. Bus rapid transit (BRT) is also a possibility for this corridor, and will be assessed further in the MAG Phase II Major Investment Study for Grand Avenue.

Figure 55: Northwest High Capacity Transit Network



7.6.2 Fixed Route and Demand Response Transit

Based on the results of the Valley Metro Regional Transit Systems Study, a significant increase in transit service will be needed as the Northwest Valley develops. Figures 56 and 57 show the extensive coverage to be added to the limited service available only in the easterly most portions of the Northwest Valley today. Table 28 below indicates the breakdown of service by type and proposed level of service in revenue hours.

7.6.3 Transit Facilities

The major facilities needed to support the proposed growth in transit services are shown in Figure 58.

Park and Ride Facilities – 13 new park and ride lots with associated amenities would be built in the Northwest Valley under the transit scenario evaluated in the RTSS. This includes 4 lots specified in the existing Transportation Improvement Program and 9 proposed throughout the Northwest Valley strategically located to offer ready access to major highways and LRT or BRT corridors.

Transit Centers – two new transit centers are needed in the Northwest Valley, one near Bell Road and Loop 101, the other near the terminus of the Central Phoenix/East Valley LRT. These in addition to the existing centers, will be a focus of transit activity in the Northwest Valley and are likely to precipitate further supporting facilities such as improved bicycle and pedestrian access.

Table 28: Transit Requirements (from Valley Metro Regional Transit System Study)

	Transit Needed		Proposed Service					
MPA	Current 2000	Future 2030	Urban Fixed-Route	Urban Circulator & Other	Rural Transit Access	Rural Transit Access	ADA Paratransit	Elderly Paratransit
	(Rev Mi)	(Rev Mi)	(Rev Mi)	(Rev Mi)	(Rev Mi)	(Rev Hrs)	(Rev Hrs)	(Rev Hrs)
Avondale	1,052	4,367	3,928	258	180	8	23	16
Buckeye	564	16,510	13,773	808	1,929	80	106	79
El Mirage	291	1,949	1,897	52	na	na	16	14
Glendale	7,095	11,716	12,598	0	na	na	71	52
Goodyear	778	12,371	6,513	2,402	3,456	144	77	83
Litchfield Park	103	376	444	0	na	na	2	4
Peoria	2,958	10,472	8,865	1,163	444	18	92	131
Phoenix	50,844	82,271	70,863	10,039	1,369	57	522	411
Surprise	1,160	10,760	9,530	410	819	34	93	148
Tolleson	485	1,075	1,176	0	na	na	2	2
Wickenburg	347	882	na	na	882	37	5	7
Youngtown	163	295	156	140	na	na	5	9
Maricopa County	2,876	5,356	3,584	0	1,811	75	110	271

Figure 56: Local Northwest Network and Rural Transit Access

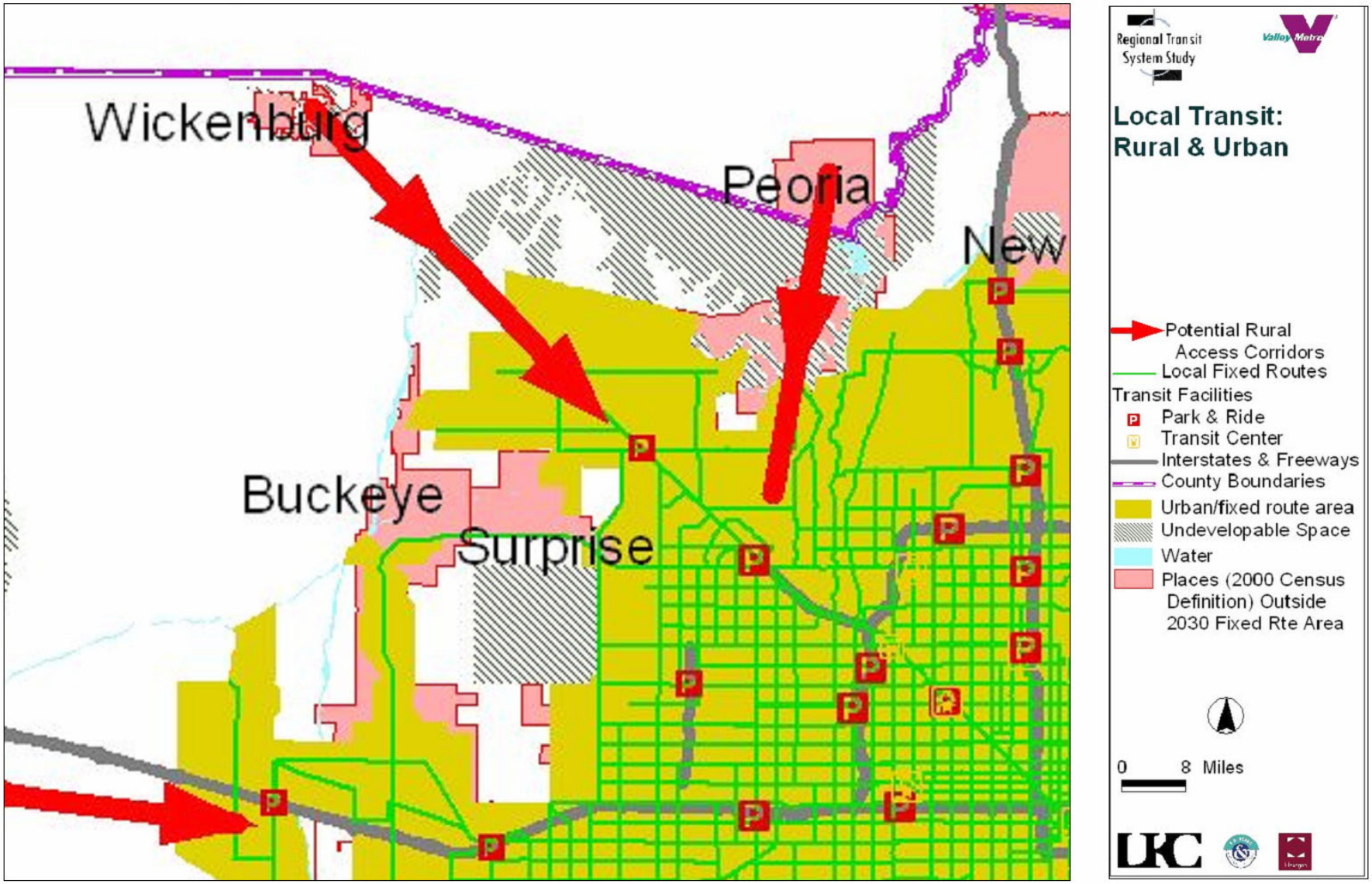


Figure 57: 2030 Northwest Local Transit Service Needs

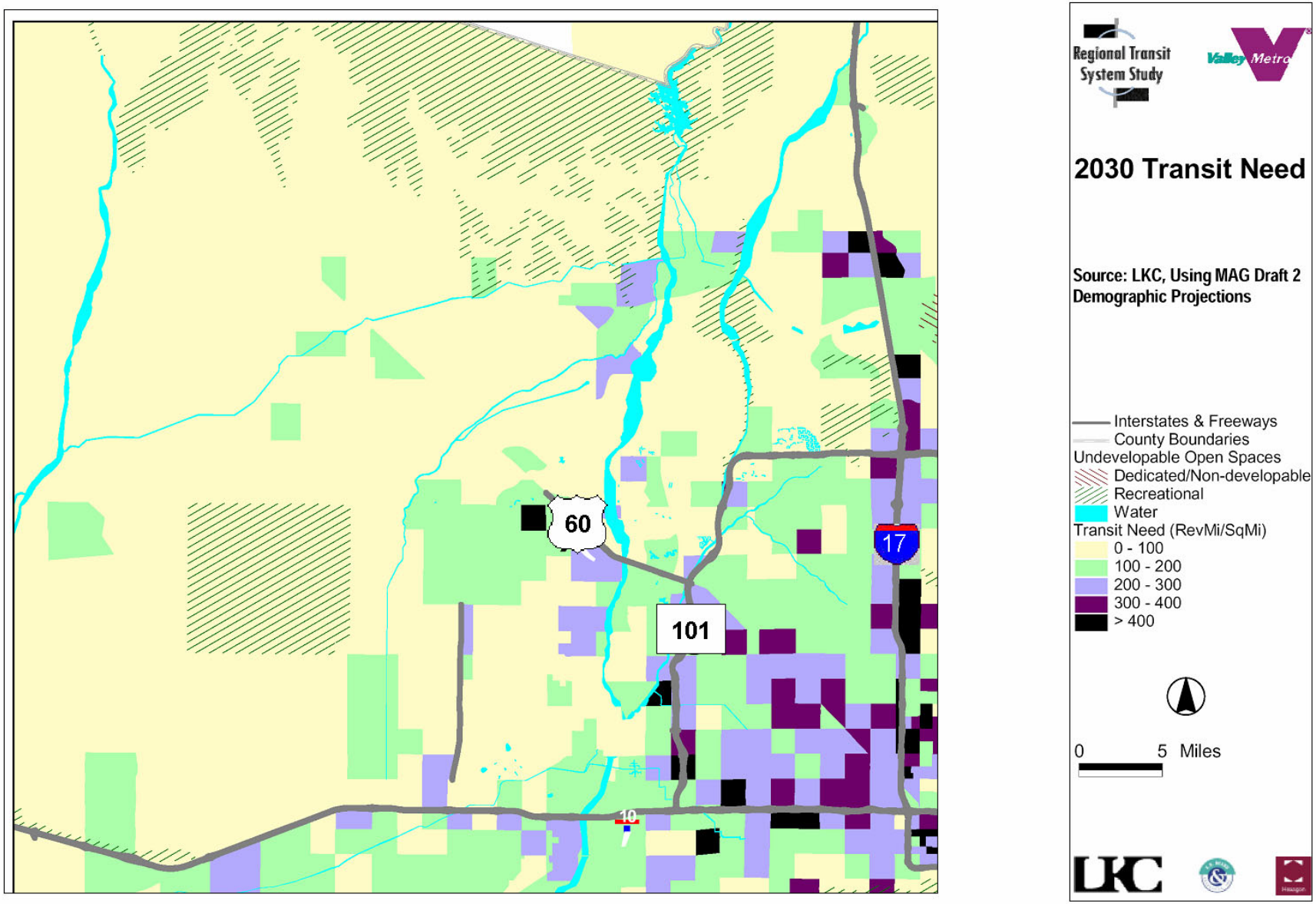
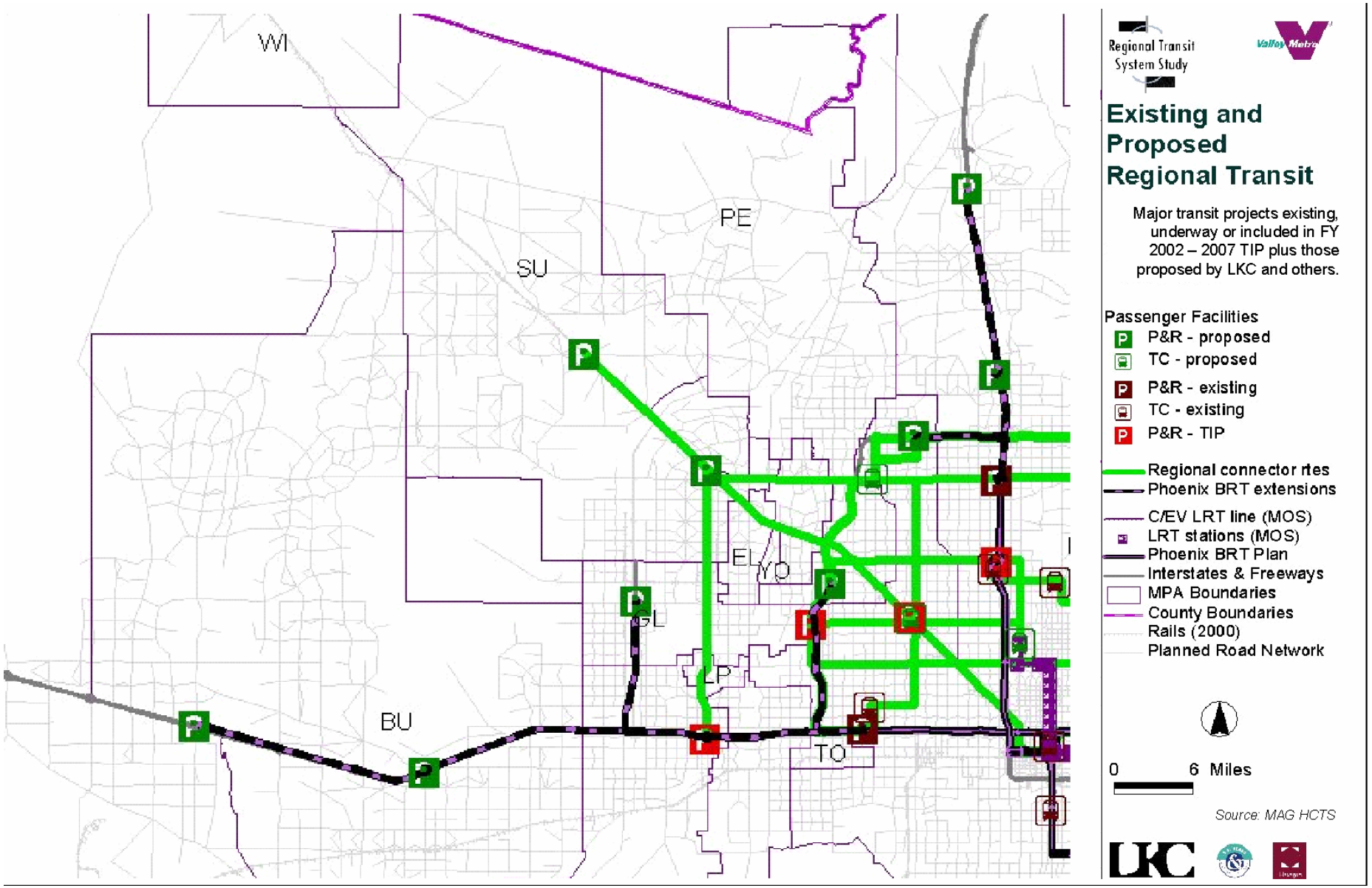


Figure 58: Proposed Regional Connections



7.6.4 Transit Costs

The costs identified for the transit systems are based on the work completed by MAG and Valley Metro-RPTA on the High Capacity Transit Study and the Regional Transit Systems Study. They are included as a means of offering a more complete picture of the multimodal needs in the Northwest Valley. The figures in Table 29 are capital costs based on the highest priority corridors and services reported in the two studies.

Table 29: Capital Cost of Transit Improvements

PROJECT	COST (BRT / LRT)
Grand Avenue Commuter Rail*	$740 million
Glendale Avenue LRT	$430 million
I-10 West LRT/Dedicated BRT	$400 million
59th Avenue LRT/Dedicated BRT	$730 million / $360 million
Bell Road LRT/Dedicated BRT	$700 million / $345 million
MetroCenter LRT	$340 million
Transit Service Vehicles	$90
Park and Ride Lots	$40
Transit Centers	$8
TOTAL	$3.47 billion / $2.74 billion

* *Bus rapid transit is also an option for Grand Avenue. Its costs would be expected to be lower than costs for commuter rail service*.

7.6.5 Non Motorized Elements

The emphasis on the non-motorized plan identified in this report for the Northwest Valley was to identify those off-road routes that could afford improved connectivity and wide-ranging access within the area. On-road bicycle facilities are included in the estimate of arterial costs, but selected supporting policies are reiterated to complement the recommended capital improvements. Under these assumptions, 130 miles of bicycle facilities were identified along major flood control corridors, canals and other linear features. The Future Non-Motorized Off Street System Map (Figure 60) shows the location of the main corridors recommended to expand the Northwest Area non-motorized plan. In addition, there are many on-street facilities identified for implementation in the MAG Regional Bicycle Plan and in the Long Range Transportation Plan that will serve as a method for identifying critical on street links to be phased in over time.

More generally, with a focus on the policy component of the plan, it is also appropriate to strengthen the commitment to improving the local as well as the regional path systems to ensure the long term integrity and internal connectivity of the plan. The objective is to take advantage of other transportation capital projects where possible and minimize what would otherwise be a substantial burden on limited regional non-motorized funds.

Policies that would support the orderly expansion of the non-motorized plans include:

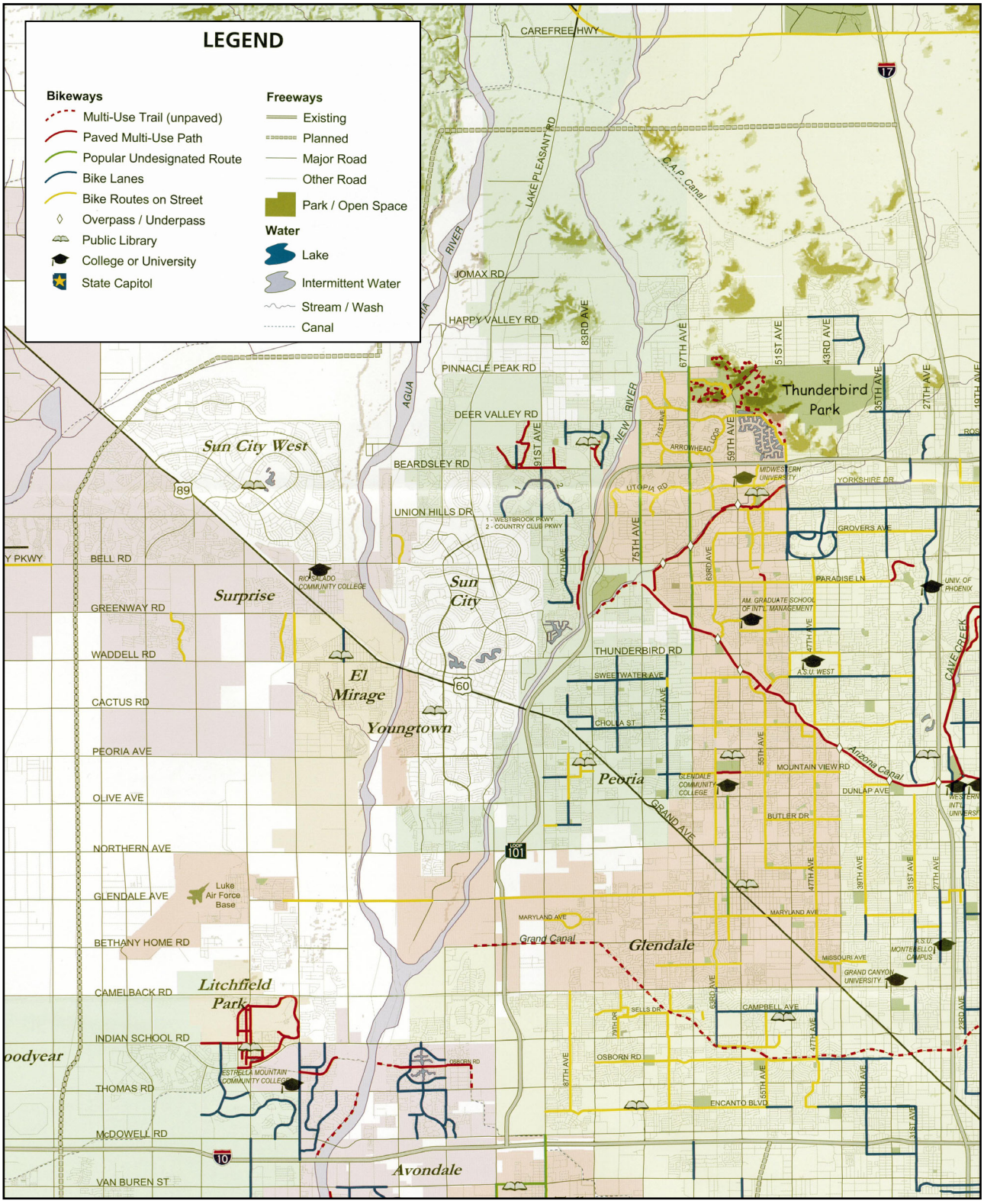
- Consistent with the assumptions for arterial construction costs, all future roadway improvements should accommodate bicycle projects to ensure continuity in the regional bicycle system with strong connectivity to the local network. This includes not only bike lanes on street, but also the addition of bicycle detection devices and proper bicycle striping at street intersections and investigating the opportunity to add bike lanes when restriping lanes as well as during new construction. Where necessary, communities should consider adopting modified roadway cross-sections to allow safe expansion of the bicycle system as proposed in the MAG Regional Bicycle Plan.

- A primary funding element should include construction of bridges and crossings that help eliminate barriers to bicyclists and pedestrians such as at or near freeways/expressways and major drainage courses. Some of this is covered in the funding proposed in this report for major regional off-road paths.
- In support of the transit program, transit facilities such as stations and park and ride lots must accommodate bicycle amenities (e.g., lockers, bike racks, etc) to encourage use of non automotive modes of travel.

Table 30: Regional Non-Motorized System Off-Road Costs

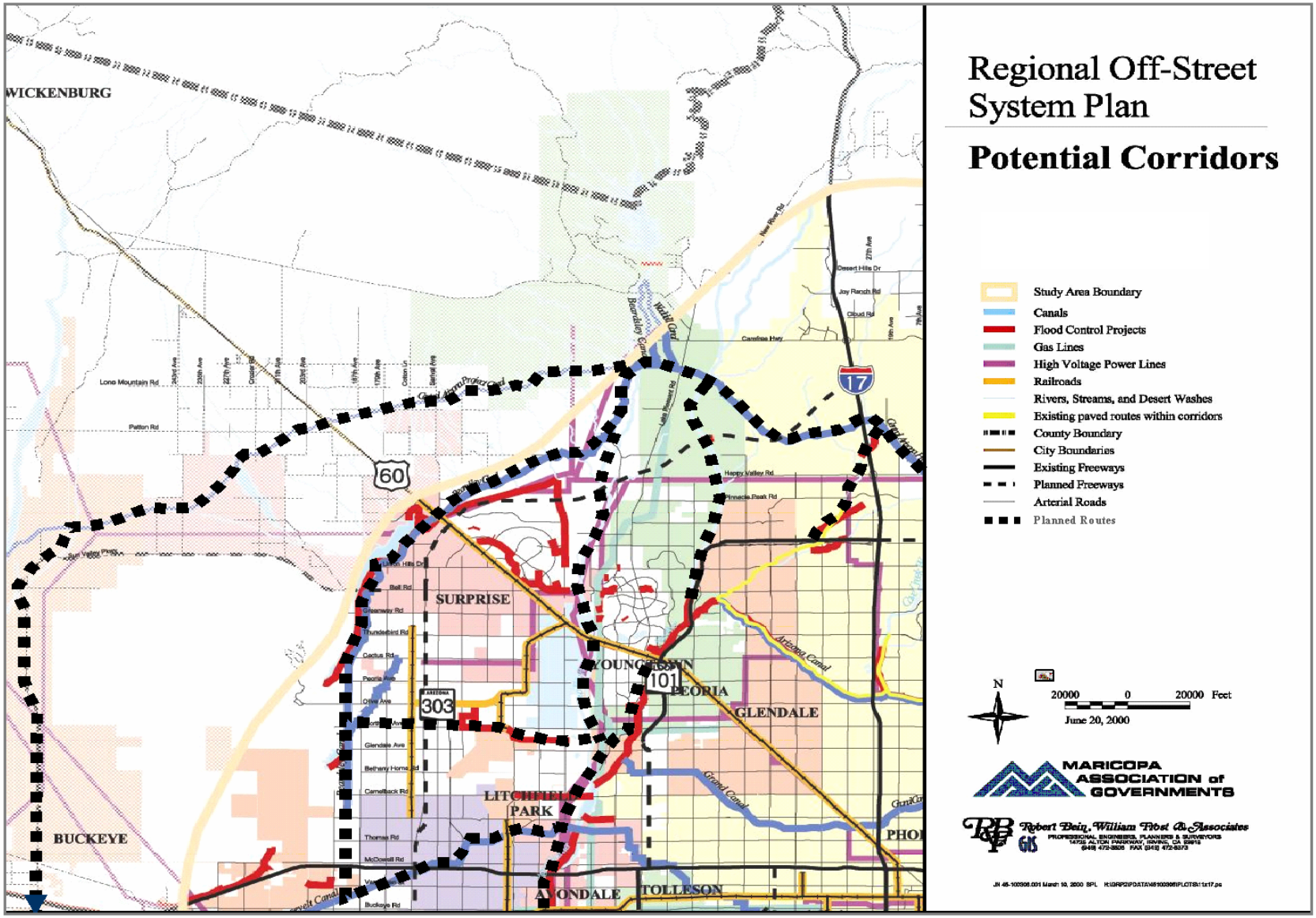
Element	Miles	Cost (Millions)
NW Regional Off-road Bicycle Improvements	130	$200
TOTAL	130	$200

Figure 59: Existing Bicycle and Multi-Use Facilities



Source: Bikeways Metropolitan Phoenix Area, Maricopa Association of Governments, 2003

Figure 60: Regional Off-Street System Corridor Map



7.7 Goods Movement

The pattern of goods movement, as measured by truck volume forecasts, remains fairly constant across the alternative scenarios. Average daily truck volumes are illustrated in Figures 61-65.

As summarized in Table 31, trucks represent approximately 27% of all traffic assigned. This is 40% of all freeway traffic in the 2000 scenario, 43% in the Enhanced Corridors scenario and 36% in both New Corridors scenarios. Trucks travel more miles on freeways than streets in the 2000 scenario, but then this pattern flips in the Future Base case where heavy freeway congestion forces a higher percentage of all traffic onto the arterials. When more roadway capacity is added in the Enhanced Corridors scenario, there is a slight shift back to the freeways. When even greater capacity is added to the freeway system in the New Corridor scenarios, it appears that trucks return to the pattern of predominant freeway usage. Interestingly, the total truck VMT in the Future Base scenario is notably lower than in the other future scenarios. With the massive congestion on I-10 in that scenario it could be expected that trucks get routed through other parts of the region.

Table 31: Truck VMT (in millions)

	2000			FUTURE BASE			ENHANCED			NEW CORRIDORS (A)			NEW CORRIDORS (C)		
	truck	auto	All	truck	auto	All	truck	auto	All	truck	auto	All	truck	auto	All
FREEWAY	3.4	5.0	8.4	5.5	8.4	13.9	7.6	10.0	17.6	9.6	17.3	26.9	9.2	16.2	25.4
STREET	2.0	9.4	11.4	10.0	35.5	45.5	9.5	33.0	42.5	7.5	27.0	34.5	7.8	27.6	35.4
TOT	5.4	14.4	19.8	15.5	43.9	59.4	17.1	43.0	60.1	17.1	44.3	61.4	17.0	43.8	60.8
FREEWAY	40%	60%	100%	40%	60%	100%	43%	57%	100%	36%	64%	100%	36%	64%	100%
STREET	18%	82%	100%	22%	78%	100%	22%	78%	100%	22%	78%	100%	22%	78%	100%
TOT	27%	73%	100%	26%	74%	100%	28%	72%	100%	28%	72%	100%	28%	72%	100%
FREEWAY	63%	35%	42%	35%	19%	23%	44%	23%	29%	56%	39%	44%	54%	37%	42%
STREET	37%	65%	58%	65%	81%	77%	56%	77%	71%	44%	61%	56%	46%	63%	58%
TOT	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Figure 61: 2000 Truck Volumes

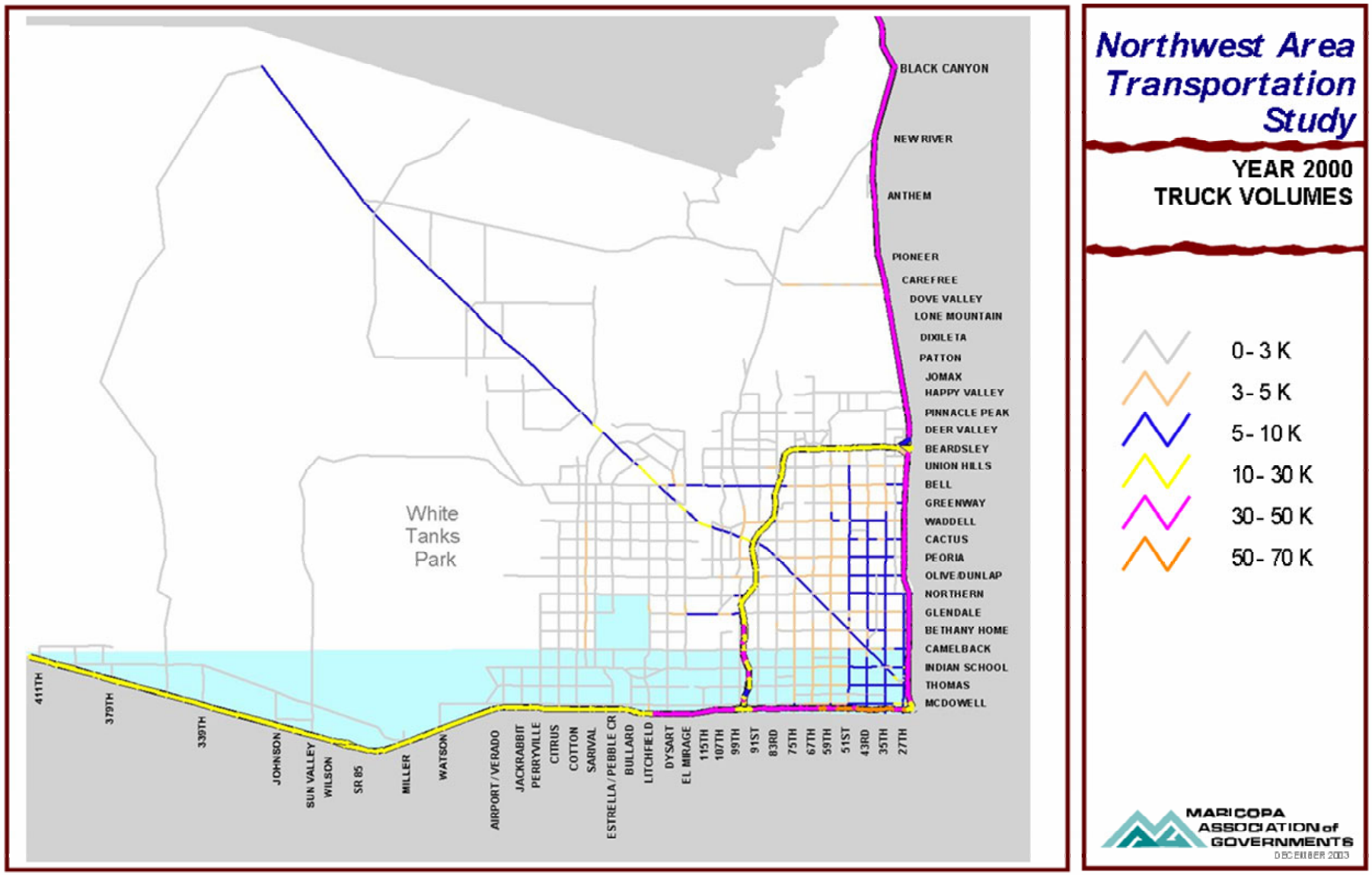


Figure 62: Future Base Truck Volumes

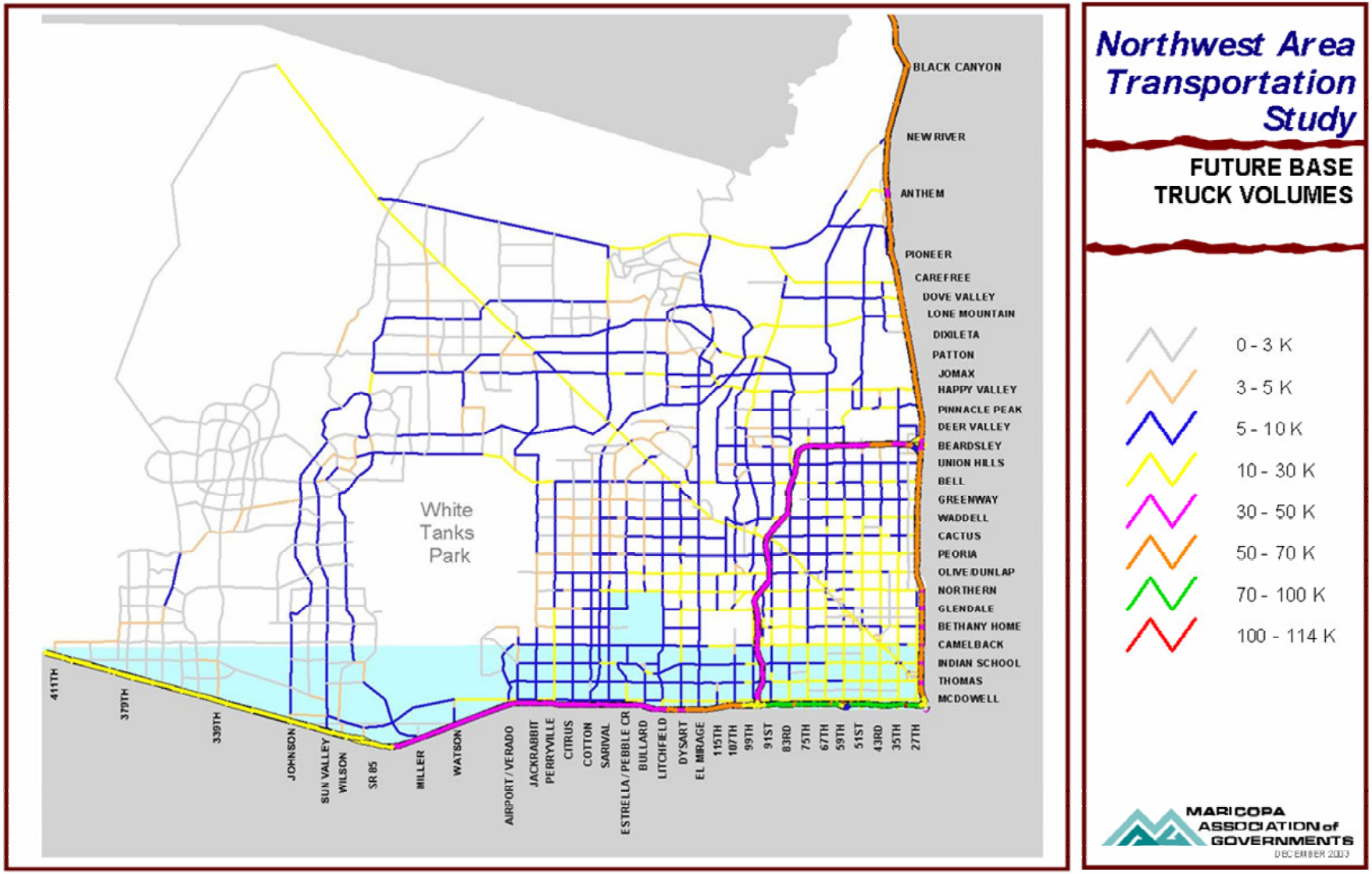


Figure 63: Enhanced Corridors Truck Volumes

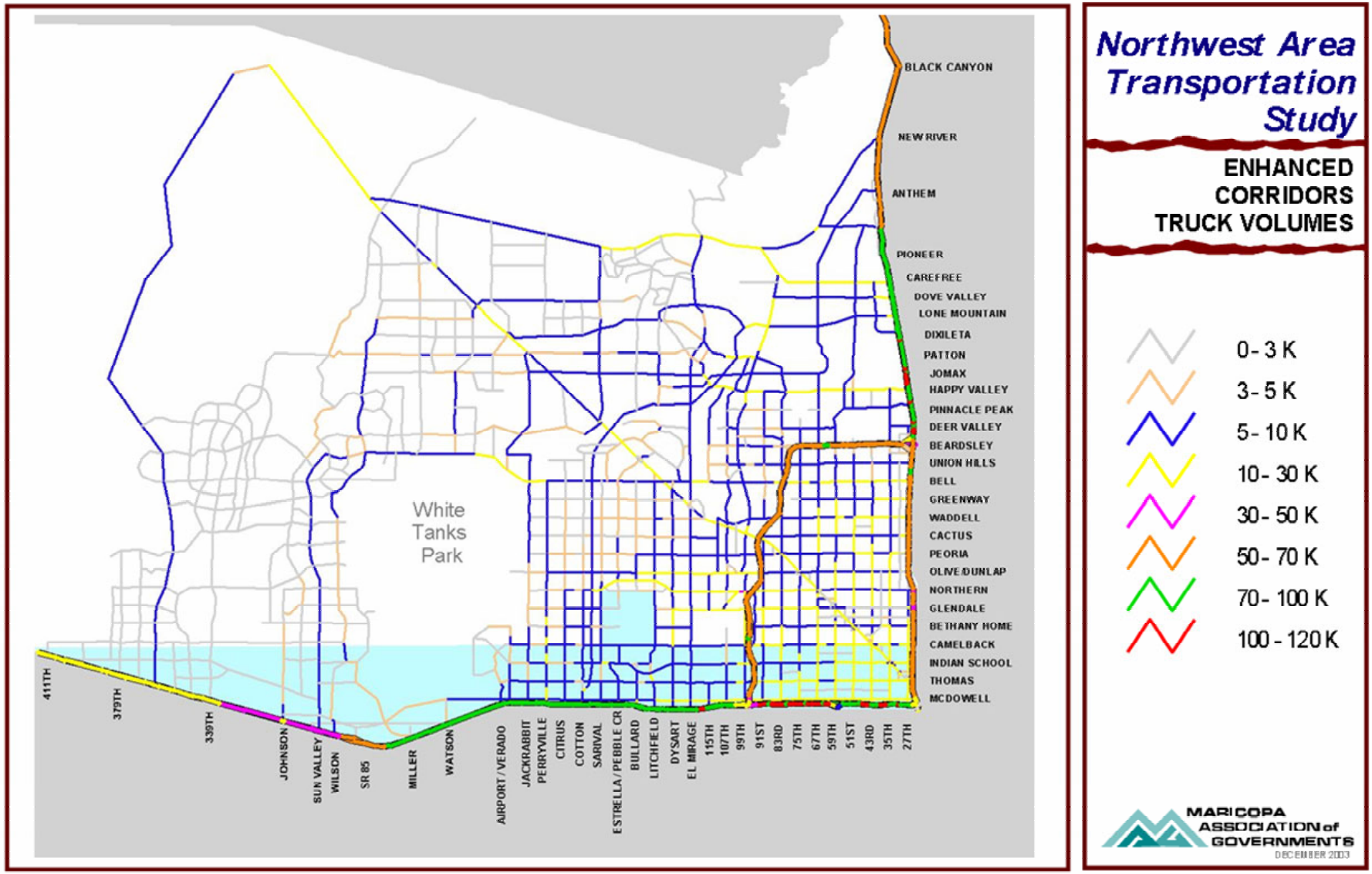


Figure 64: New Corridors Option A Truck Volumes

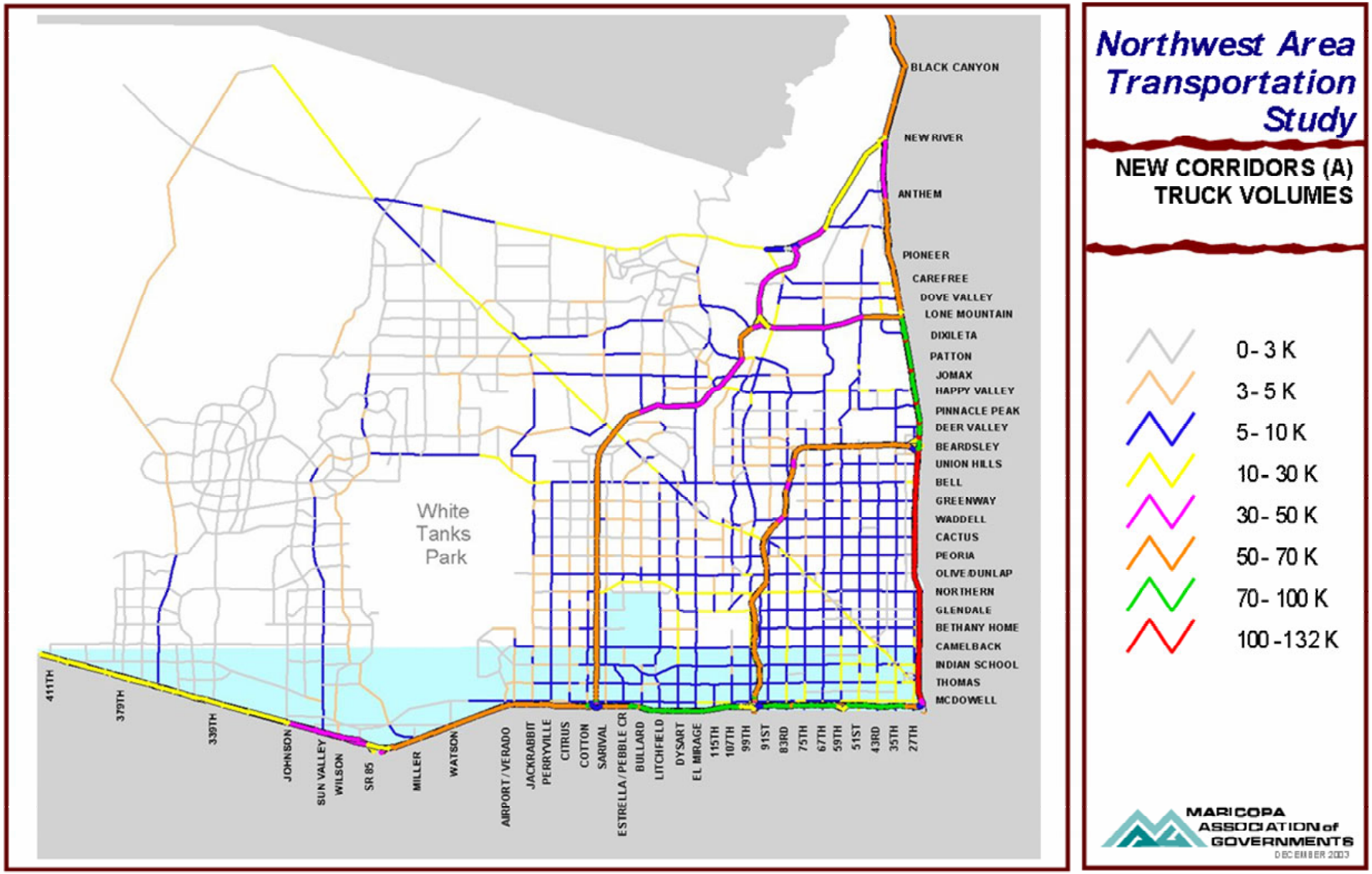
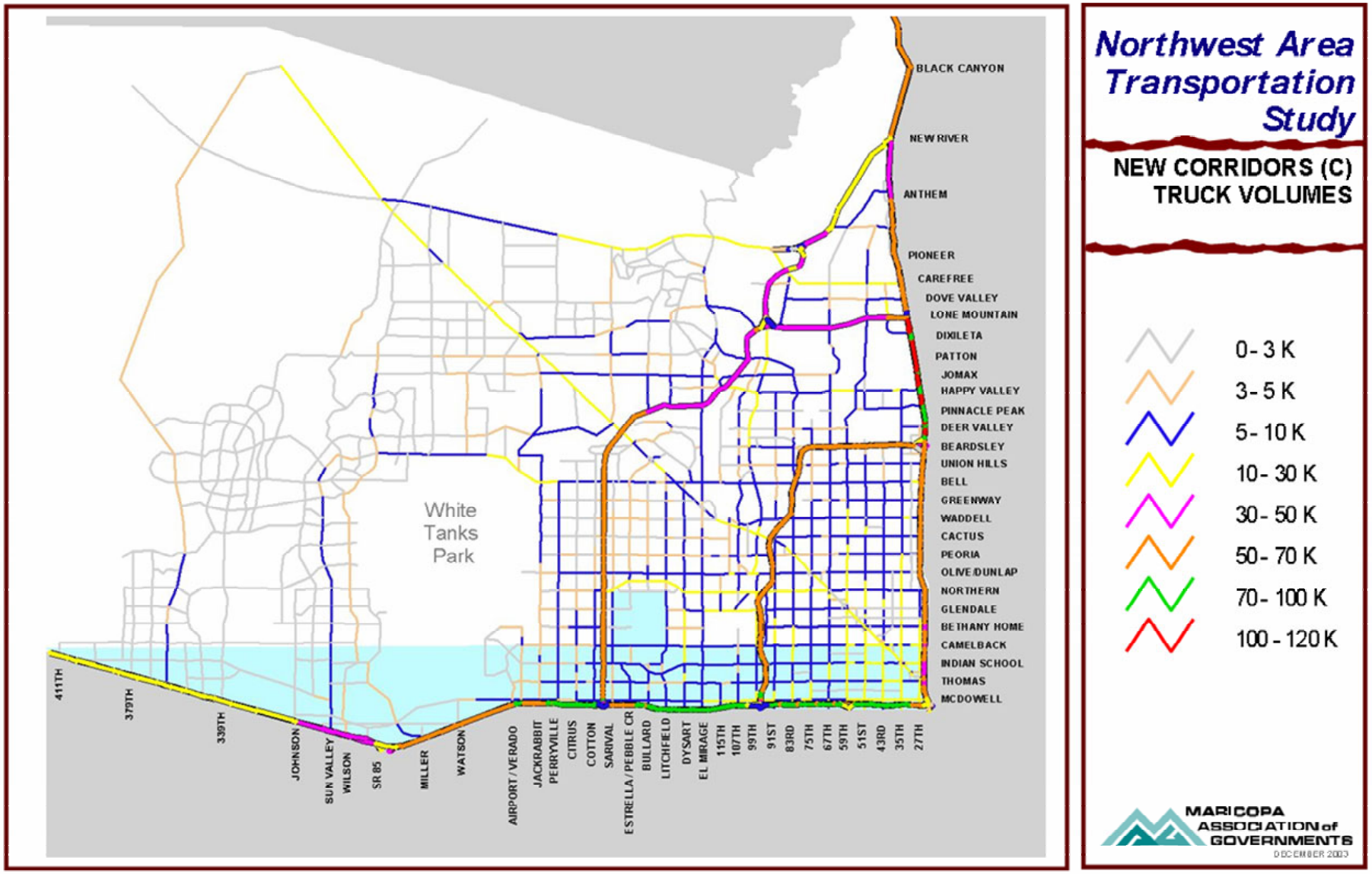


Figure 65: New Corridors Option C Truck Volumes



7.8 Model Run Conclusions

In analyzing the results of the regional travel demand model, there are a couple of key measures that help describe the performance of a facility or system.

Level of Service

Level of Service (LOS) is the term used to describe the degree of traffic congestion on a roadway. The various levels of service range from A to F, in increasing order of congestion.

Level of Service can be estimated for various different roadway parameters and time frames. LOS can be calculated for roadway segments, intersections, freeway mainline, and ramps. LOS can also be calculated for different time periods including daily, AM peak hour, and PM peak hour.

Volume to Capacity Ratio

The operating efficiency of a roadway segment can further be defined by comparing volume to capacity (v/c.) The ratio of the volume on a segment of road compared to the traffic capacity of the segment is known as the v/c ratio. This is calculated for each segment by simply dividing the traffic volume or forecast for the segment by the capacity of the segment. For this analysis, the daily volume was compared to the daily capacity to obtain a v/c ratio. The volume to capacity ratio is equated to level of service to define the performance of a road segment. The relationship between V/C ratio and level of service is summarized in Table 32.

Table 32: LOS and V/C Relationship

LEVEL OF SERVICE	V/C RANGE
A	0.0 to 0.6
B	0.61 to .7
C	0.71 to 0.8
D	0.81 to 0.9
E	0.91 to 1.0
F	greater than 1.0

Analysis of Model Results

Not surprisingly, each set of improvements beyond the Future Base Network provides some benefit. As the major improvements are added to the plan, the modeling results show a marked improvement in level of service and a reduction of the number of lane-miles that show V/C greater than .9. Though many lane miles are added in the Future Base Network, the number of lane miles that reach V/C ratios above .9 grows more than tenfold. This is largely because the new corridors are primarily in the growing areas of the Northwest Valley, where they will support future growth. The increase in congestion is primarily located within already developed areas, where opportunities to add lane capacity are constrained by potential high impacts and costs. The elements of the Enhanced Network improve the performance of the system, reducing the congested lane-mile count by over 20%. The addition of new corridor improvements substantially reduces congestion impacts by an additional 45%. Comparable improvements are noted in the number of congested intersections. Tables 33 and 34 summarize salient model results for the various alternatives tested.

Table 33: Roadway Performance Measures

MEASURE	2002	FUTURE BASE	ENHANCED	NEW HIGHWAYS
VMT (million)	21	62	66	66
Lane Miles – V/C .9	250	2,800	2,200	1,200
Congested Intersections	99	456	409	281

This New Corridors analysis shows, however, that funding major roadway improvements, such as freeways and major corridors, have a much greater impact on congestion mitigation and improving overall system performance than smaller roadways.

Transit planning work currently underway includes a substantial number of new transit - corridors. However, at the time of this report, modeling information was not available from the High Capacity Transit Study or the Valley Metro Regional Transit System Study to establish their contribution to the performance of the overall transportation system. Results from these transit studies will be considered in the RTP process.

Transit planning work currently underway includes a substantial number of new corridors. However, modeling information was not available to establish their contribution to the performance of the overall transportation system. These results, and any appropriate amounts of funding, will be included in the next phase of the RTP.

Contribution of other modes to congestion mitigation is less quantifiable. These modes however improve mobility and quality of life and should be viewed in that light.